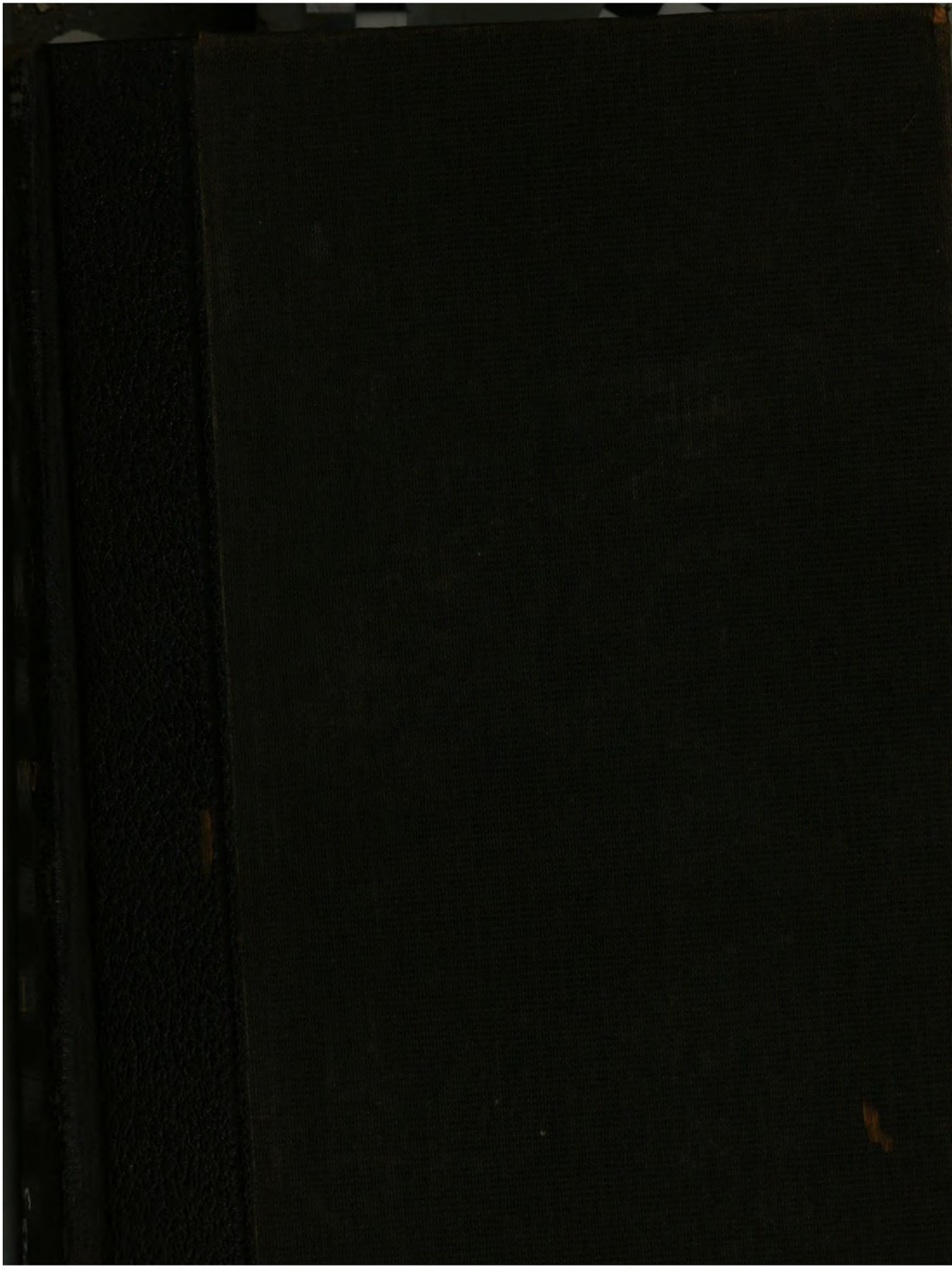
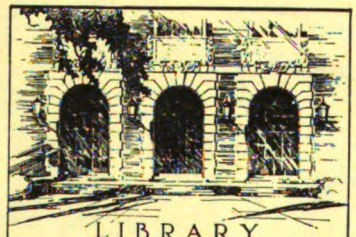
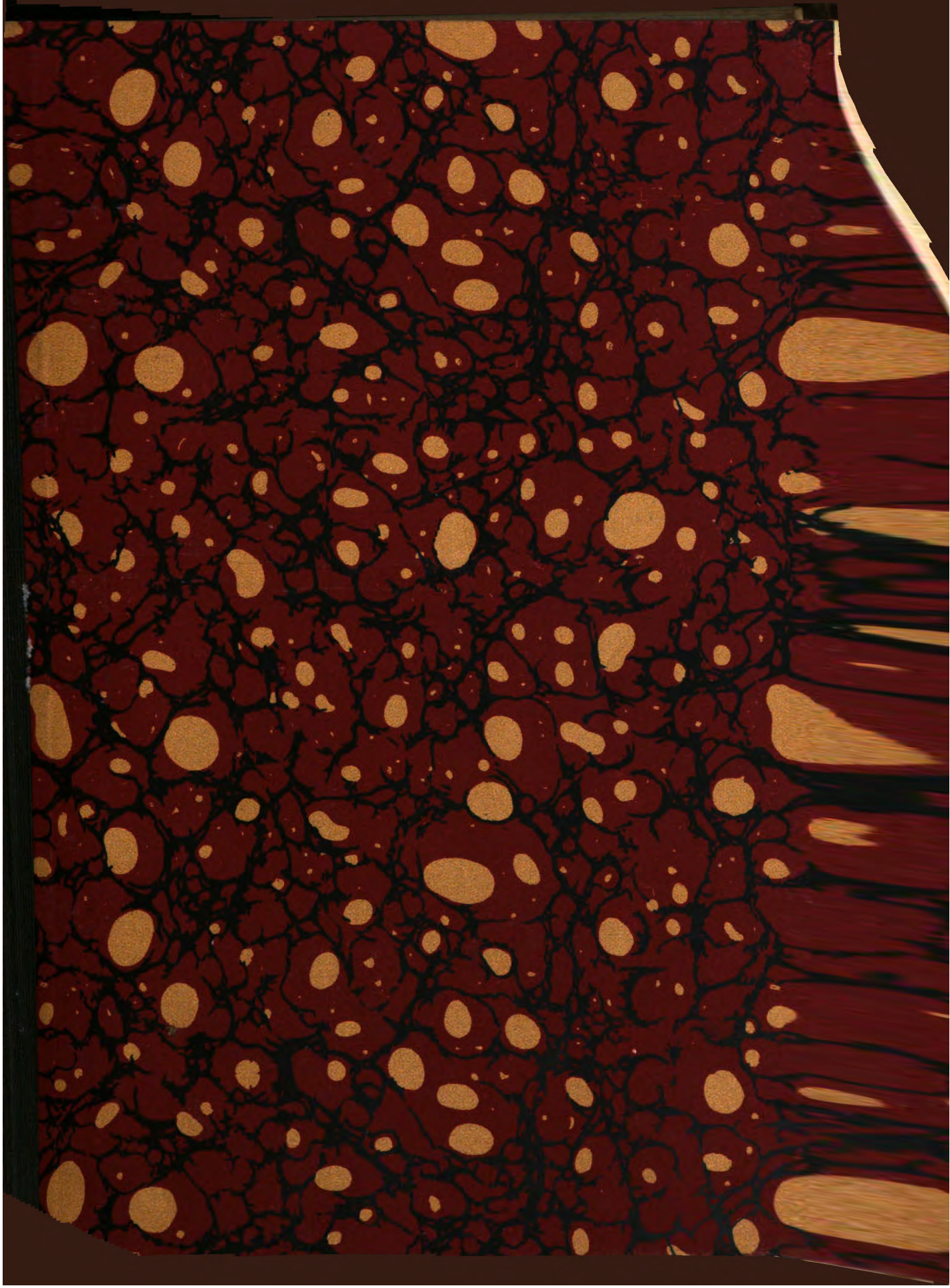




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VOLUME II

CHICAGO BOONE PITTSBURG TORONTO

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state. The latter is a brownish-black ore and is the principal source of chromium. Chrome green, or ultramarine green, is a pigment obtained from chromium. Chromium steel is a kind of steel which contains about one per cent. of this metal, and is valuable for its great hardness and tenacity. Deposits of chromite are found in Asia Minor, Bohemia, Norway, and the Rocky Mountains of Canada and the United States.

CHRONICLES (krŏn'ĭ-k'ls), a portion of the Bible. It forms but one book in the Hebrew, but was divided into two books by the Septuagint translators and was placed directly after I and II Kings. The Hebrew name means *words of day;* thus, has the same significance as our diaries or journals. The Chronicles are among the latest compositions of the Old Testament, and show evidences that the writer knew of many of the earlier books. In the first nine chapters is a line of genealogies which covers a period from the creation to the middle period of the Persians. The work contains valuable contributions to our knowledge of the history of the Israelites.

CHRONOGRAPH (krŏn'ô-grȧf), an instrument used to measure and record minute portions of time. It is intended specially for measurements in astronomy, where a record is desired of the exact instant of the occurrence of an event, such as the transit of a star. The so-called recording chronograph is designed to mark the instant of observation in hours, minutes, seconds, and hundredths of a second, in printed characters, and in a form suitable for preservation and reduction. Another form of the chronograph is used at horse races and other occasions where a seconds watch is not exactly suited. It has an ordinary quick-train lever movement, carrying hands which move over a dial. One of these is a seconds hand, which is usually double, consisting of two distinct hands, one superposed over the other. Chronographs used in astronomical observation are usually moved by electricity.

CHRONOLOGY (krô-nŏl'ô-gў), the science of computing and adjusting dates and epochs of time by divisions and periods to facilitate in assigning events to their proper times. The system of chronology differs among the nations of the world. The motions of the heavenly bodies produce the natural divisions of time into days, months, years, and cycles. Exact computation can be made only from a point or *epoch,* which is taken to mark the beginning of an *era.* The Jews compute from the creation of the world; the Christians, from the birth of Christ; the Greeks, from the Olympiads; the Romans, from the building of Rome; and the Mohammedans, from the *Hegira* or flight of Mohammed. Besides these, there are various other epochs and data on which to base the assignment of historical facts, scientific discoveries, or notable events occurring in the history of the world. In the Christian chronology, the years before Christ are marked B. C. and those after, A. D. (*Anno Domini,* in the year of our Lord).

CHRONOMETER (krô-nŏm'ê-tẽr), an instrument for the exact measurement of time. The term does not especially include clocks, watches, hour glasses, and other similar devices for the measurement of time, but is restricted more particularly to the instruments having compensations and adjustments to render them independent of the fluctuations of temperature. Their chief use is for making astronomical observations and in measuring longitude at sea. The capacity of these instruments to keep accurate time under great variations of temperature determines their value. Those used at observatories are carefully tested by exposure to heat and cold varying from about —60° to +120°, the extremes within which they are expected to keep exact time. Chronometers used on ships are suspended in gimbals, so the instruments will always maintain the same position.

CHRYSALIS (krĭs'ȧ-lĭs), the last stage through which moths and butterflies pass when going from the larva or caterpillar state to the perfect or winged state. In this stage the insect takes no food, is inactive, and is inclosed in a transparent case composed of fibers spun by the larva. Many species, while in this stage, have a metallic luster. The length of this period depends upon the species and the season. It is attended by changes that take effect in the interior of the insect, its organs securing proper development for the support of the future being.

CHRYSANTHEMUM (krĭs-ăn'thê-mŭm), a flowering plant common to the temperate parts of America and Europe. It belongs to the Compositae order and includes about 150 species. Many are cultivated in gardens and parks for their flowers. The common species include the *golden feather, corn marigold, marguerites,* and *ox-eye daisy.* Various species have been cultivated in China many years and several were brought to Europe in 1764, where they have been developed by cultivation into many colors and forms. They bloom in gardens late in the fall, in some localities in October, November, and December. In shape they range from the plain to the double and semidouble species, and the flowers are either erect or reflexed. They are propagated by the seeds and by cuttings.

CHRYSOLITE (krĭs'ô-lĭt), a mineral composed chiefly of iron, silica, and magnesia. It occurs in transparent crystals and is usually of a greenish color, but sometimes black, and is used as a cheap kind of ornamental stone by jewelers. Chrysolite is found in basalt near Montreal and other parts of Canada, in the Hawaiian Islands, in Arizona, and in New Mexico. The species found in New Mexico closely resemble garnet and are called *Job's tears* from their peculiar appearance.

CHRYSOPRASE (krĭs'ô-prāz), a greenish

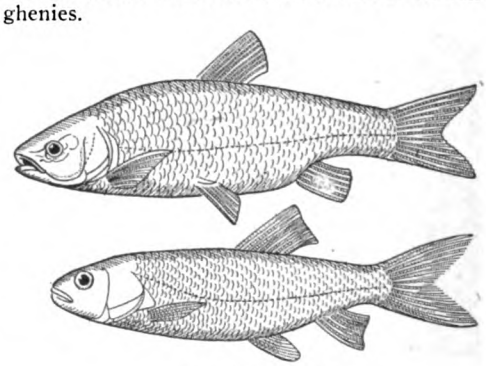
variety of chalcedony, valued as an ornamental stone. It is found in the mountains of Oregon, especially at Riddles, and in several places of Germany. Jewelers use it to some extent for mountings in rings, and the inferior specimens are employed in making necklaces, brooches, and seals. Some grades lose their color with age, especially if kept in a light and warm place.

CHRYSOSTOM (krĭs'ŏs-tŭm), **John, Saint,** named "golden-mouthed" on account of his eloquence, born at Antioch, Syria, in 345 A. D.; died Sept. 14, 407. His instruction was thorough and of a religious order, and he became a monk, preaching successfully much of the time. The earnest training of his mother led him to become serious, gentle, and earnest. He was ordained deacon in 381 and presbyter by Bishop Flavinus in 386. He was so successful and eloquent that the attention of the Jews, heathens, and heretics was attracted, and in 397 he was elevated to the episcopate of Constantinople. In this office he exercised such discretion and economy that he was able to devote a portion of his revenues for charity and hospitals, gaining by his liberality the surname of "John Almoner."

Chrysostom sent missionaries into Palestine, Persia, Scythia, and other countries in an endeavor to spread Christianity. His popularity excited the jealousy of the pagan rulers, which caused his banishment to Pityus, a tract of desolate land on the Black Sea, at the eastern verge of the Roman Empire. Accordingly, he was required to make the journey on foot with his bare head exposed, the cruelty proving fatal. After his death, a Christian sect known as *Johannists* sprang up, who refused to acknowledge his successors, but in 438 they returned to the general communion. His memory is celebrated by both the Greek and Roman churches. The former celebrate the festival of Chrysostom on Nov. 13, and the latter, on Jan. 27.

CHRYSLER'S FIELD, a locality in Dundas County, Ontario, and the site of a battle in the War of 1812. The American army was commanded by Gen. Wilkinson and the British and Canadian troops were under command of Lieutenants Pearson and Morrison. On Nov. 13, 1813, the Americans made the attack in the open fields of John Chrysler, a British military captain then in service. The battle lasted five hours, victory alternately favoring one and then the other. Night ended the conflict with the British in possession of the field. The American loss was 339 and the British lost 187 men.

CHUB, a fish of the carp family, found chiefly in the rivers of Europe. The upper parts are bluish-black, passing into silvery white beneath, and the cheeks are yellow. It weighs about five pounds at maturity and is esteemed for the table. Anglers find it good game, and use worms, cheese, and cured meat for bait. The chub spawns in April and May and bites best in June and July. Several allied species are found in America, including the *chub* of the Columbia River and the *river chub* of the Alleghenies.



AMERICAN CHUB.
RIVER CHUB.

CHUQUISACA (chōō-kĕ-sä'kä), the name formerly given to the capital of Bolivia. It is now commonly called Sucre, which see.

CHURCH, a term first used by the New Testament writers to denote the whole community of Christians, and now applied to the whole body of Christians collectively. It is employed in a more restricted sense to designate a distinct denomination of Christians, as Lutheran, Roman Catholic, Greek Church, Methodist, etc. It is also applied to a building set apart and consecrated for Christian worship. Many public halls or basilicas, courts of adjudicature, and heathen temples were consecrated as Christian churches after the conversion of Constantine. Later special edifices of wood, brick, or stone were built in various styles of architecture. These are designated as chapels, churches, collegiates, conventionals, or cathedrals, this depending upon the style of architecture and the purpose they serve. Many of the ancient churches have the semicircular *apse,* in front of which is the *altar,* and near the latter is the *choir.* This arrangement is maintained in some of the newer edifices, but many modern churches have neither the apse nor the altar, and in some buildings the choir occupies one entire upper end of the church.

CHURCH, Frederick Edwin, painter, born at Hartford, Conn., May 14, 1826; died April 7, 1900. He studied under Thomas Cole at Catskill, N. Y., and painted many scenes in the Catskill Mountains. In 1849 he was elected a member of the National Academy, and in the years 1853 and 1857 traveled in South America. In 1863 he made a tour through Labrador and three years later through Europe, visiting Palestine and the West Indies in the same journey. Many of his paintings were exhibited at the World's Columbian Exposition in 1893 and at other similar exhibitions. Among his most noted works are "Horse-shoe Falls, Niagara," "The Andes of Ecuador," "The Rainy Season in the Tropics," "Valley of Santa Isabella," "Damascus," "Jeru-

salem," "The Parthenon," and "Niagara from the American Side."

CHURCHILL (chûrch'îl), an important river of Canada, rises between the Athabasca and the north branch of the Saskatchewan. It has a northeasterly course and flows into Hudson Bay. Its entire length is about 850. It receives the Beaver River, which rises in Alberta, and drains a large number of lakes, including Reindeer and South Indian lakes. Missinippi and English are other names of the Churchill River.

CHURCHILL, Randolph Henry Spencer, Lord, statesman, born at Blenheim, England, Feb. 13, 1849; died Jan. 24, 1895. He was the second son of the sixth Duke of Marlborough, studied at Oxford, and entered Parliament in 1874. His ability as a Tory debater made him leader in 1880. He became Secretary of State for India in 1885, but the speedy downfall of the Salisbury administration caused him to return to England. With the return of Salisbury to power, in 1886, he became Chancellor of the exchequer and leader of the House of Commons, but after successful work he resigned at the end of the year. In 1887 he made a trip through Europe, seeking to form an alliance against Germany, and in 1891 visited South Africa. He married a daughter of Lawrence Jerome, of New York, in 1874.

CHURCHILL, Winston, novelist, born in Saint Louis, Mo., Nov. 10, 1871. He graduated at the United States Naval Academy in 1894, and soon after began to write naval stories for magazines. In 1903-05 he was a member of the Legislature of New Hampshire. For some time he edited the *Army and Navy Journal,* and became managing editor of the *Cosmopolitan Magazine* in 1895. His writings include "Richard Carvel," "The Crossing," "Coniston, "The Crisis," "A Far Country," and "Mr. Crewe's Career."

CHURCHILL, Winston Leonard Spencer, soldier and author, born in England, Nov. 30, 1874. He joined the army in 1895 and served with the Spanish forces in Cuba. Subsequently he saw service in India and Egypt, and was granted a medal for gallantry in the Battle of Khartum. He was correspondent for the *Morning Post* during the Boer War, and was present at the battles of Spion Kop and Vaal Krantz, and the operations in the vicinity of Dewetsdorp. Later he took part in the engagements at Johannesburg and the capture of Pretoria. He was elected to Parliament from the district of Oldham in 1900 and was made Under Secretary of State for the Colonies in 1906. His chief publications include "The River War," "Ian Hamilton's March," "From London to Ladysmith via Pretoria," and "Lord Randolph Churchill."

CHURN, a vessel in which cream or milk is agitated to effect the separation of the butter from the fluid portions. The churn of the pioneers is usually made of a conelike tub, in which the churn dasher is moved by means of a rod or stalk fixed to it. Those of newer manufacture have an inner device by which the churning is effected, or, in other cases, the entire vessel is made to revolve on a shaft. Many of the larger farms have churns that are worked by a gasoline engine or steam or horse power. The churns used in creameries are very large and are propelled by steam power. In some cases the machine is a combined churn and butter worker.

CHURUBUSCO (chōō-rōō-bōōs'kō), a village of Mexico, located six miles south of the City of Mexico. It was the scene of a battle between the Americans under Gen. Winfield Scott and the Mexicans under Gen. Santa Anna on Aug. 20, 1847. The Mexican army was guarding the approach to the city and was entirely defeated. Gen. Scott captured 3,000 prisoners and thirty-seven fieldpieces, and gained the battle at Contreras on the same day. The American loss was 1,053 men, while the Mexicans lost in killed and wounded about 4,000.

CHUSAN ISLANDS (chōō-sän'), an island group on the east coast of China, the largest of which is called Chusan. This island is from six to twelve miles wide and about twenty-two miles long. Much of the surface is mountainous, with fertile valleys penetrating among the hills. Rice, cotton, tea, tobacco, camphor, and bamboo are the leading products. The mountain districts contain valuable minerals. These islands were in the possession of the British in 1840, 1841, and 1860. The group contains several monasteries and Buddhist temples. Tinghai, a fortified town, is the chief settlement. For the purpose of administration the islands belong to the province of Chekiang. Population, 1908, 345,540.

CHYLE (kīl), a milky fluid found in the lymphatic vessels of the bowels during digestion. It is opaque and under certain circumstances assumes a yellowish or slightly reddish color. After the food is digested in the stomach, it is converted into a yellowish liquid known as *chyme,* which passes into the duodenum, where it is acted upon by the pancreatic secretion and bile. The result is the *chyle,* which, in the thoracic duct, is an oily liquid of considerable turbidity, and is carried into the veins and mingled with the blood. The nutritive portion of the food is contained in the chyle.

CIALDINI (chäl-dē'nē), **Enrico,** Duke of Gaeta, soldier and statesman, born Aug. 8, 1811; died in Leghorn, Sept. 8, 1892. He was first a pupil under the Jesuits and later studied philosophy and medicine at the University of Parma. In 1831 he participated in the Romagnian insurrection. Subsequently, in 1849, he fought in the Austro-Italian War, and later in the Crimean War. Owing to his bravery and success, he was made lieutenant general and in 1861 was created Duke of Gaeta, and the same year became field marshal. He was chosen a senator of Italy in 1864, and devoted the remainder of his life to

politics and diplomacy. He was one of the most distinguished Italians among those opposing the papal army and the church influence upon the government of Italy.

CIBBER (sĭb'bĕr), **Cooley,** dramatist and actor, born in London, England, Nov. 6, 1671; died Dec. 11, 1757. He was of Danish extraction and his father was noted as a sculptor. In 1688 he enlisted in the military forces to support the Prince of Orange, and the following year began to act comedy with some degree of success. He became manager of the Drury Lane Theater, in 1710, and was made poet laureate of England in 1730. Three years later he retired from the stage, but reappeared occasionally as an actor in comedy. In 1740 he published a work entitled "Apology," which contains a history of the stage in the time of Queen Anne. Other writings include "The Non-juror," "The Careless Husband," and "Love's Last Shift."

CICADA (sĭ-kā'dà), the name applied to a genus of hemipterous insects common to many regions of both hemispheres. They are well known by their peculiar notes, which are made by drumlike appendages attached to the sides of the body, called the *timbal.* The eggs are deposited in the twigs of trees or shrubs by the adult female insects. The larvae fall to the ground and burrow, and during the larval state feed on the juices of roots. Several species occur in North America, among them the *seventeen-year locust,* which lies beneath the ground seventeen years, after which it emerges to become a perfect insect. However, the development is hastened by heat; hence, in the warmer localities, the broods come out in about thirteen years. Some cicadas require much less time in developing, while different areas are frequented by these insects in different stages of development; thus, cicadas develop almost every year. In the United States a record has been kept of about fifteen different broods that appear at definite places and times.



SEVENTEEN-YEAR LOCUST.
A, Adult; *B,* Larva.

CICERO (sĭs'ĕr-ō), **Marcus Tullius,** Roman orator, essayist, and writer, born at Arpinum, Jan. 3, 106 B. C.; suffered death Dec. 6, 43 B. C. He belonged to an ancient equestrian family of considerable influence, his father being a man of culture. His education was designed to fit him for eminence in the state, for which purpose he was taken to Rome, where he was taught under the direction of the orator Crassus, and became acquainted with the language and literature of Greece. At the early age of sixteen he was introduced to the public life of Rome. His discipline in oratory, instruction in law, and knowledge of philosophy and science were alike complete. His mental exercises were in no way neglected to bring out his greatest powers, and render him fit to occupy a high station among the statesmen and philosophers of Rome. Among his early cases at law was the defense of Roscius, a private citizen, against a favorite of Sulla. Later he traveled in Greece and Asia to become acquainted with Eastern learning, and, on his return, ranked as the leading orator at the Roman bar. In the year 76 he was elected quaestor and was appointed to a government in Sicily, where he ruled with much ability and gave general satisfaction.



MARCUS TULLIUS CICERO.

On his return to Rome, Cicero prepared six orations against Verres, a governor of Sicily, and placed the Sicilians under obligations to himself by his successful management of the case. Beginning in the year 70, he passed through the offices of aedile and praetor, and in 63 was elected to the consulship by an overwhelming majority. In the capacity of consul he became eminent by frustrating the conspiracy of Catiline, in delivering against him his famous "Orations against Catiline." By his promptness and efficiency he secured the friendship of the senators and was hailed by Cato and Catulus as the "Father of his country." Public thanksgivings were voted in his name. His popularity subsided with the expiration of his consulship, largely because of being charged by his enemies with having occasioned the execution of several conspirators without a formal trial, and he was obliged to seek safety in Thessalonica. After six months of exile, he was recalled to Rome and received with much enthusiasm. The envy of the honorable party of the senate was excited by his recovered dignity, and he desired to form a close friendship with them and with the influential factors of the state, Pompey and Caesar. Both courted his alliance and coöperation. This placed him in a peculiar position and caused him to be betrayed into many actions, which increased the power of the triumvirs. In the years 51-52 he administered in the province of

Cilicia and returned to Italy on the eve of the Civil War. He first became allied with the side of Pompey and the republic. Later he secured the friendship of Caesar and accompanied him to Rome.

During the remainder of his life Cicero devoted much attention to the preparation of his orations and essays. Among the most celebrated, aside from the "Orations against Catiline," are "Philippics against Antony," "Essays on Friendship," "Old Age," and "The Whole Duty of Man." After the assassination of Caesar, he first endeavored to unite his interests with Brutus, but afterward refrained from doing so. In the events that followed he was friendly to Octavianus, which friendship was the occasion of the "Philippics against Antony," named from the speeches of Demosthenes against Philip of Macedon, and these were the cause that led to his death. The proscription issued after Antony, Lepidus, and Octavianus had formed a triumvirate included Cicero's name among the proscribed. While endeavoring to escape from Tusculum, where the news of the proscription reached him, he was overtaken by Antony's soldiers. With a remarkable self-composure he put his head forward and offered his neck to the sword of his executioners.

CICERO, a town of Cook County, Illinois, on the Illinois Central, the Chicago, Burlington and Quincy, and other railroads. It is contiguous to Chicago and has vast manufacturing plants, producing terra cotta goods, telephones, and machinery. The place was incorporated in 1869. Population, 1910, 14,557.

CID (sĭd), **The,** a surname of Ruy or Rodrigo de Bivar, the celebrated hero of Spain, and the most prominent figure in Spanish literature. He was standard bearer under Sancho II., son of Ferdinand of Leon, and became commander of the royal troops. The successor of King Sancho, Don Alonzo, banished him and caused his joining the Moorish kings of Saragossa against both Moslems and Christians. Later he led fierce wars against the Moors, and established himself as lord of Valencia, in 1904. His life is revived in the "Cid Poems," "Cid Romances," and Southey's "Chronicles of Cid."

CIDER (sī'dĕr), a liquor made from the juice of any fruit, but most commonly from apples. In making apple cider the juice is pressed from the crushed apples by a cider press and allowed to flow into casks. It ferments in the open air and a clear liquor results. The fruit used should be ripe, as the per cent. of sugar in ripe apples is much greater than in partially ripe or green, and therefore yields a larger proportion of alcohol. Fresh cider is a sweet, pleasant beverage. Cider brandy, or *applejack,* is obtained by distilling fermented cider.

CIENFUEGOS (sē-ĕn-fwā'gŏs), a seaport city of Cuba, capital of the province of Santa Clara, on the Bay of Jagua, an inlet on the southern coast of the island. The city is one of the finest in Cuba. It is connected with other cities by a number of railroad lines. The exports include sugar, wax, tobacco, rum, and molasses. A large number of trading vessels visit it annually and connect it with the leading seaports of the world. It has many fine public buildings and churches. There are regularly established public schools of instruction for free attendance in all parts of the city. Electric lights and street car lines were built shortly after the war with Spain. The city was founded by refugees from Santo Domingo in 1819. Population, 1907, 60,142; in 1911, 80,249.

CIGAR (sĭ-gär'), a small roll of tobacco made of tobacco leaves and designed for smoking by lighting one end and drawing smoke through it. The choicest brands are imported from Cuba, or are manufactured from tobacco grown in the vicinity of Havana. *Cigarettes* are small cigars made of a small quantity of fine tobacco and used for smoking. *Cheroots* are thicker at one end than at the other, and are smoked the same as cigars.

CILIA (sĭl'ĭ-à), the common name of hair-like processes that cover the surface of certain cells, and line the trachea and bronchia. They are in constant motion to sweep out secretions and dust. Their arrangement is in rows. The size ranges from $\frac{1}{1,000}$ to $\frac{1}{12,000}$ of an inch in length. Cilia occur upon the mucous membrane of various organs of the vertebrate animals, especially upon the epithelium, and in certain invertebrates they serve by the rapid vibration as organs of locomotion. In the cells of plants the cilia are exceedingly delicate protoplasmic fibrils.

CILICIA (sĭ-lĭsh'ĭ-à), an ancient country of Asia Minor, bounded on the north by the Tarsus Range, east by the Amanus Mountains, south by the Mediterranean, and west by Pamphylia. It included much of the fertile plain near the sea, the valley of the Cydnus River, and a mountainous region in the western part. Tarsus, the chief city, was long important as a center of education and commerce. The Cilicians were distinguished for maritime enterprise. Their country was invaded by the Assyrians, but remained independent until it was conquered by the Persians. A Roman army under Pompeius subdued the Cilician pirates in 67 B. C., who had fortified themselves in the mountains.

CIMABUE (chē-mà-bōō'à), **Giovanni,** painter and restorer of the art of painting, born in Florence, Italy, in 1240; died in 1302. He received his first instructions under Byzantine masters, who were engaged to paint a chapel in the Church of Santa Maria Novella at Florence. Two of his most remarkable paintings are of the Madonna, still preserved in the Florence academy and the Church of Santa Maria Novella. He was the teacher of Giotto, and founded the school of painters known as the Florentine,

which included the masters, Raphael and Michael Angelo.

CIMBRI (sĭm'brĭ), the name by which a people were known who fought with the Teutons of northern Germany against the Romans in the year 113 B. C. In several great battles they were victorious, but were defeated by Marcus in the Battle of Verona, in the year 101 B. C. Their horsemen were armed with helmets, spears, shields, and coats of mail. In the early battles with the Romans they displayed much courage and bravery, even the women showing many marks of daring. They are mentioned by Greek writers in connection with the Scythian Cimmerii of the Crimea, but modern writers regard them as Celtic, and connect them with the Cymri of Britain. Plutarch and Tacitus regarded them as Germans.

CIMON (sī'mŭn), son of Miltiades, a distinguished Athenian general and statesman, born about 510 B. C. He was placed in command of the Athenian contingent in conjunction with Aristides, and engaged in war against the Persians in the year 477 B. C. In the year 466 he was commander in chief, destroyed a Persian fleet of 200 vessels, and forced a retreat of the remainder of the navy and the land forces.



CINCHONA.
A, Flower; *B*, Fruit.

Later he drove the Persians from Thrace, Caria, and Lycia, and brought great riches to Athens, which he used in public improvements. He advocated the allegiance with Sparta in opposition to Persia, but was opposed by the democracy headed by Pericles, and was banished as an exile, but was recalled after five years. He died in the siege of a city in Cyprus, in the year 449 B. C.

CINCHONA (sĭn-kō'nȧ), a genus of trees found in the Andes of Peru and adjacent countries, and subsequently introduced into India, Java, and Ceylon. It produces a medical bark of much value, known as *cinchona bark*, from which alkaloids, cinchonine, quinine, and other valuable drugs are extracted. The bark is taken off in strips and is renewed by natural growth. In the market the product is known as *Peruvian bark*. The trees are evergreen and have opposite leaves, and the flowers resemble lilacs in appearance. The bark is carefully dried when peeled off, and afterward is baled in packages weighing about 150 pounds. Gathering cinchona bark is a growing industry in Peru and Bolivia. See **Quinine**.

CINCINNATI (sĭn-sĭn-nă'tĭ), the second largest city in Ohio, county seat of Hamilton County, located on the north side of the Ohio River, opposite the mouth of the Licking River. It is 115 miles southwest of Columbus, 270 miles southeast of Chicago, 765 miles from New York, and the focus of a network of important steam railroads and electric railway lines. The Miami and Erie Canal connects the navigation of the Ohio River with that of the Great Lakes, hence it has transportation facilities that are rarely excelled.

DESCRIPTION. The city has an area of thirty-eight square miles, with a river frontage of nearly fourteen miles. It is built upon two picturesque plateaus, the first of which is near the river and is sixty-five feet above low water mark, while toward the north it rises in abrupt steps to a height of 400 feet above the Ohio. The elevated portions are surrounded by a series of semicircular bluffs, affording a fine view of the city and the surrounding country. Improved highways and inclined plane railways make the summits of the hills as well as the plateaus easily accessible, including the beautiful localities known as Mount Auburn, Price's Hill, Mount Adams, Fairview Heights, and College Hill. The city has a number of popular residence districts and suburban places, such as Avondale, Clifton, Winston Place, and East Walnut Hills, these being specially noteworthy for their fine homes and scenic beauty. Across the river, in Kentucky, are Newport, Covington, Bellevue, and a number of other towns and villages. Five bridges cross the river, affording ample facilities for passage by trains, vehicles, and pedestrians. The mean temperature is 55°, while the average in winter is 34° and in summer 75°.

Cincinnati is platted regularly and most of the streets cross each other at right angles. Many large business and office buildings are located in the central business section, which is substantially and compactly built. The Federal

building contains the customhouse, post office, and Federal court, and was erected at a cost of $5,000,000. It is three stories high, in the Roman-Corinthian style, and is built of a durable quality of freestone. The Masonic Temple, Chamber of Commerce, city hospital, city hall, county courthouse, Odd Fellows' Hall, and several banks and department stores are among the chief buildings, many of which have from ten to twenty stories. Many fine churches are located in different parts of the city. The First Presbyterian Church has a tower 285 feet high. Saint Peter's Cathedral, a Roman Catholic place of worship, is in the Grecian style and has a stone spire 224 feet high. Saint Paul's Protestant Episcopal Cathedral, the First and Second Presbyterian churches, Saint Paul's Methodist Episcopal Church, the Jewish Synagogue, and Saint Francis de Sales Catholic Church are splendid examples of ecclesiastical architecture. All of the Protestant denominations are well represented and have commodious and substantial places of worship. The total number of churches exceeds 200. Cincinnati is the seat of a Protestant Episcopal bishop and of a Roman Catholic archbishop.

Parks. The parks are a feature of the city and cover an area of 575 acres. A collection of wild animals is the chief feature of the Zoölogical Garden, which contains sixty acres, and is beautiful on account of its fine walks and picturesque ravines. Eden Park, or Garden of Eden, located on Mount Adams, incloses 216 acres and is the seat of the Art Museum and Art School. Burnet Wood embraces sixty acres and is located in the northern part of the city. An avenue 100 feet wide has been constructed to Spring Grove Cemetery, the largest and best known, which contains 600 acres. Besides it there are about twenty-five other burial places. Fountain Square, on Fifth Street, contains the Tyler-Davidson Fountain and is beautified by many rare flowers and vines. This fountain was cast of bronze at Munich, Germany, and cost $200,000. At Race and Eighth streets is a statue of Garfield, and at Vine and Eighth is an equestrian statue of President William Henry Harrison. Other statues include those of Lincoln and a bronze statue commemorating the soldiers who died in the Civil War, the latter being located in Spring Grove Cemetery.

Institutions. The public schools range from the kindergarten to the high schools, which fit for entrance into colleges and universities, and have departments of manual training. Among the higher institutions is the University of Cincinnati, with an observatory at Mount Lookout. It is the seat of the Wesleyan Female College, Lane Theological Seminary, Ohio Mechanics' Institute, Saint Joseph's and Saint Xavier's Jesuit College, and a Hebrew college. The art and professional schools include musical and medical colleges and institutions for instruction in law, commerce, pharmacy, and dentistry. The Museum and Art School, located in Eden Park, has a fine collection of statues and paintings. The public library, with 325,000 volumes, is located in a commodious building on Vine Street. Other libraries include those of the Young Men's Mercantile Association, of the Cuvier Club, of the Ohio Mechanics' Institute, and a number of others. Public charities are numerous.

Industries. Important as a railroad center and located on the Ohio River, Cincinnati has extensive commercial intercourse with the leading cities of America. The Union Depot on Third Street and Central Avenue is the converging point of most of its railways, but separate stations are maintained by the Pennsylvania and a number of other lines. About 8,000 manufacturing establishments of different kinds are located in the city. These include chiefly slaughterhouses, packing establishments, carriage and wagon works, foundries, breweries, brickyards, machine shops, and boot and shoe factories. In pork packing it takes rank next to Chicago. On Mount Adams is the Rookwood Pottery, which has a wide reputation for the manufacture of artistic and meritorious wares. The city has a large trade in cotton and woolen textiles, furniture, butter and cheese, grains of different kinds, fruits, and merchandise. It is noted as a center of wholesaling.

Hotels and Theaters. The chief hotels include the Emery, Grand, Saint Nicholas, Palace, Dennison, Sinton, Havlin, and Gibson. Among the chief places of amusement are the Grand Opera House, Columbia Theater, Arbiter Hall, Walnut Street Theater, and the Lyceum. The Music Hall, endowed by Reuben Springer, has a seating capacity for 5,400 persons and contains one of the largest organs in America. Musical societies are very numerous, owing to the large number of German residents. When Charles Dickens visited America for the first time he found more to commend in the social refinement and art advancement of Cincinnati than in any other city of the United States.

History. George Rogers Clark erected two small blockhouses on the site of Cincinnati in 1780, which was probably the first time the locality was visited by white men. The first settlement was made in 1788, when a company from Kentucky and New Jersey settled on a tract of land purchased from the government by John Cleves Symes. Fort Washington was built in 1789, and the following year the place was named Cincinnati by Gen. Saint Clair, in honor of the Society of the Cincinnati. It was made the county seat of Hamilton County at this time, was incorporated in 1802, and became a city in 1819. Its prosperity dates with the opening of steamboat navigation on the Ohio in 1815. The Miami Canal was completed in 1830 and the first railroad was built in 1843. The citizens of Cincinnati generally opposed antislavery agitation, owing to their close social and com-

mercial relations with the South, but sided with the Federal government during the Civil War. It was threatened by a Confederate force under Gen. Kirby Smith in 1862 and for a time was under martial law. In 1883 a large part of the lower city was submerged by a flood which destroyed many business houses. The famous Cincinnati Riot, incited by the light sentences imposed upon a number of murderers, resulted in burning the courthouse and caused the death of forty-five persons. Population, 1910. 364,463.

CINCINNATI, Society of, an organization formed in 1783 by the American and foreign officers in the Revolutionary War. The original purposes included the care for widows and orphans of soldiers who had lost their lives, but later it partook more and more of the nature of perpetuating mutual friendships and remembrances of the noted revolutionary events. It was named from Cincinnatus, the great Roman hero, because he, like many of the members, had been called from the farm in defense of the country. The society now consists of a central organization with branches in the states of Virginia, Maryland, South Carolina, New York, New Jersey, Pennsylvania, Massachusetts, and Rhode Island. Meetings are held triennially, occurring in 1899, 1902, etc.

CINCINNATI, University of, a coeducational institution of higher learning at Cincinnati, Ohio. It was founded on bequests made in 1868 by Charles McMicken, and a number of grants were added subsequently by the city. In 1873 the university was opened for instruction; the academic department was added the following year, the medical department was organized in 1896, and the law department was consolidated in the following year with the law school of the Cincinnati College, founded in 1833. The university as now organized includes the academic, law, medical, and graduate departments; the college of engineering; and the summer school. Affiliated with it are the Ohio College of Dental Surgery and the clinical and pathological school of the Cincinnati Hospital. It has a library of 95,000 volumes, a faculty of 175 professors and instructors, and an attendance of about 2,250 students. The endowments and buildings, including equipments, have a value of $4,500,000.

CINCINNATUS (sin-sin-nā'tus), **Lucius Quintius,** Roman statesman and patriot, born about 519 B. C. He is regarded a model of simple manners and patriotic virtues, although he was uncompromisingly a patrician. He was chosen consul in 460, and was made dictator two years later. When the message of his election was sent from Rome, he was found plowing on his small farm. Among his first noted achievements was the rescue of Lucius Minucius, who had been defeated by Aequi, and was surrounded by his forces. After holding the dictatorship for sixteen days, he retired to his farm on the Tiber. In 439 he was again made dictator, and rendered good services by suppressing an insurrection of the plebeians.

CINERARIA (sĭn-ē-rā'rĭ-à), a genus of plants native to South America, including about twenty-five species. They include the garden cineraria, which is an annual with simple leaves and is popular as a greenhouse plant. It is easily cultivated and blooms freely, the flowers being asterlike and include red, white, and purple colors. Most plants of this class have lower leaves with an ashy appearance, hence the name.

CINNA (sĕ'nà), **Lucius Cornelius,** Roman statesman and a principal supporter of the faction of Marius. He obtained the consulship in the year 87 B. C. Soon after he united with Cneius Octavius in the impeachment of Sulla, and led a strong agitation in favor of the recall of Marius. After the return of Marius, he sided with him and aided in massacring a number of orators and statesmen, after which the two declared themselves consuls. The army refused to follow Cinna after the death of Marius in preparation to meet Sulla in battle, and he was slain by a number of troopers in the year 84 B. C. His daughter Cornelia was married to Julius Caesar.

CINNABAR (sĭn'nà-bär), the name applied to the sulphide of mercury. It is blood-red in color, crystallizes in the hexagonal system, and is found both massive and crystallized. The *vermilion* of commerce is a valuable pigment and is an artificial mercuric sulphide, while the native cinnabar is mixed with impurites that prevent it from being used directly as a pigment. Cinnabar is found in several localities of the Rocky Mountains, in New South Wales, in Austria, and in South Africa.

CINNAMON (sĭn'nà-mŭn), an aromatic bark taken from the under branches of several species of the cinnamon tree, a plant of the laurel order. Several species are found in Ceylon, Malabar, and various portions of the East Indies. The trees have yellow flowers, acorn-shaped fruit, and oval leaves, and attain a height of from fifteen to thirty feet. The bark is a staple article of commerce. It is used in the culinary arts and for manufacturing an essential oil. Oil of cinnamon is prescribed in doses of from one to five drops as a stimulant and in the treatment of stomach ailments. See **Spices.**



1. CINNAMON. 2. BARK.

CIPHER (sī'fĕr), in mathematics, a character which of itself possesses no value, but when placed after a number increases it tenfold. In decimal fractions a cipher before a number decreases its value tenfold. See **Cryptography.**

CIRCASSIA (sĕr-kăsh'ĭ-ā), a region in the northwestern part of the Caucasus, in Russia. It is bounded on the north by the Kuban River, on the east by the country of the Lesghians, on the south by Mingrelia, and on the west by the Black Sea. The region is mountainous and is inhabited by the Circassians, a class of warlike mountaineers. Circassia has been a part of Russia since 1829.

CIRCASSIANS (sĕr-kăsh'anz), the name applied to a tribe inhabiting Circassia, a mountainous region in the southeastern part of Russia, in Europe, and including largely the northern slopes of the Caucasus. The inhabitants are divided into a number of tribes with different languages. In religion they are nominally Moslems, but their worship is mixed somewhat with Jewish, Christian, and heathen ceremonies and traditions. They were an independent people in the early part of the 15th century and carried on wars against the Tartars, to whom they afterward became tributary. With the enlargement of Russian territory, they were absorbed after much resistance, and showed further hostilities by leaving Russian possessions and emigrating to the provinces of Turkey. The men are prized as soldiers, while the women are chosen as mistresses by the Turks and are among the handsomest in the harems. The total number of Circassians is estimated at about 150,000.

CIRCE (sĕr'sē), a fabulous personage mentioned in Homer's "Odyssey" as a sorceress. She is described as a beautiful enchantress, the daughter of the sun and the sea nymph Perse. It is represented that she dwelt in a magnificent marble palace in the fertile valley of Aeaea. She had the power of changing the form of men and women into the shapes of wolves and lions to be placed as a guard to her abode. She changed twenty-two companions of Ulysses into swine, but he proceeded to her palace with a peculiar herb which had the power of counteracting the baneful acts of Circe. The hero was received with all the grace and fascination at her command, and she presented him with a draught of wine in a golden goblet. He accepted the wine and trusted to the protection of the wonderful herb, which was efficient in guarding him against her perils. She now became attached to the hero and warned him against future dangers, and advised him regarding his destiny. His ship was loaded with provision for the voyage and she reluctantly bade him farewell. She graciously restored to him his former companions on his departure.

CIRCLE (sĕr'k'l), a plane figure bounded by a curved line called its *circumference*, every part of which is equally distant from a certain point within called the *center*. The *radius* of a circle is a straight line drawn from the center to its circumference, and a straight line drawn through the center and terminated both ways by the circumference is called the diameter of a circle. The space inclosed *within* the circumference is called the area of a circle. The circumference of a circle is to its diameter about as twenty-two to seven or as 3.1416 to one. In astronomy the circle is divided into 360 equal parts called *degrees*, each degree containig sixty *minutes*, and each minute sixty *seconds*. In geography a circle upon the surface of the earth is called a *great circle* when its plane passes through the center of the sphere, dividing the earth into two equal parts; all others are called *small circles*.

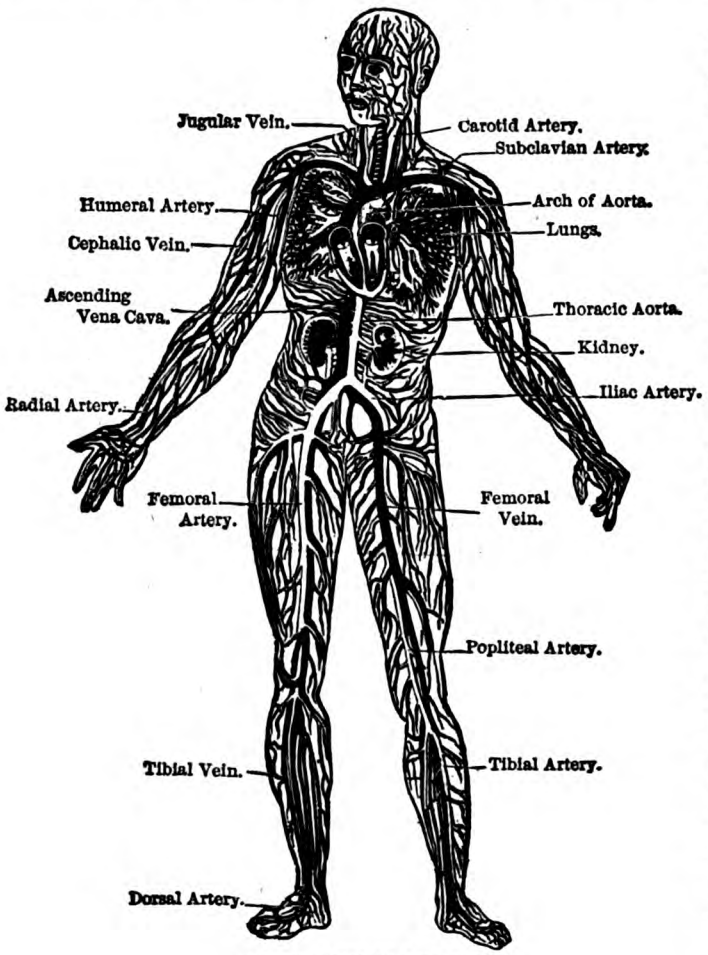
CIRCLEVILLE, a city of Ohio, county seat of Pickaway County, thirty miles south of Columbus, on the Norfolk and Western and the Cincinnati and Muskingum Valley railroads. It is nicely situated on the Scioto River and the Ohio and Erie Canal. The manufacturing enterprises include flouring mills, a packing establishment, a canning factory, and machine shops. It has a brisk trade in farm produce and merchandise. Among the chief buildings are several schools, the county and city buildings, and numerous churches. The public utilities include electric lighting, a public library, and a waterworks system. Circleville was settled in 1806 and incorporated in 1814. Population, 1900, 6,991; in 1910, 6,744.

CIRCULATION (sĕr-kŭ-lā'shŭn), in economics, a term used to designate the circulating coin and notes that constitute the currency of a country. In early times articles were exchanged under a system of barter. In the great commercial activity of modern times a monetary system is needed to facilitate convenience in conducting commercial enterprises on a vast scale. The circulation is regulated by the government, restricted to the needs of trade, and guaranteed to remain stable in the exchange for commodities and the payment of public and private obligations.

In *vegetable physiology* the term is applied to the circulation of the sap in plants. There is no close analogy between the circulation of plants and that in animals. It was thought formerly that sap ascends in the spring and descends in autumn, these two movements constituting the whole circulation. However, it is now known that ...nding and descending currents coexist, and ...ontal currents pass between the tiss... ...f sap in ascending enters the ...ed by certain influen... ... of the plant. It i... ...nding circula... culation tral organ interior of ... municating with t forms of animal appears to be no which they live se... textures.

In *animal physio*

of the blood, which is propelled by the heart, penetrating the arteries, capillaries, and veins of the entire system. Although Galen had observed that the blood flows in opposite directions in the arteries and veins, the circulation was not discovered until 1628, when Harvey demonstrated the connection of the heart with



CIRCULATION OF THE BLOOD.

the circulatory system. Malpighi used a microscope, in 1661, to demonstrate the passage of the blood in a frog's foot from the arteries to the veins by the capillaries. The accompanying illustration shows the principal organs of circulation, including the heart as the center of the system. See **Artery; Blood; Heart.**

CIRCUS (sĕr'kŭs), an inclosure of space in which sports, games, and various feats of horsemanship are exhibited. The Roman circus was a narrow, long building without a roof in which chariot races, athletic exercises, horse races, and animal fights were exhibited. It was originated by Romulus, and was made popular by subsequent rulers. The largest of the Roman circuses was the Maximus, capable of holding from 250,000 to 385,000 spectators. Among the few remains of these structures are those of the circus of Caracalla. They were usually oblong and from three to five times longer than wide. The largest in the time of Julius Caesar was 625 feet wide and 1,875 feet long. In these buildings were exhibited games, wrestling, boxing, and sea fights; for the latter purpose canals were dug. The conquerors usually brought large herds of wild animals from foreign countries to exhibit in games for the enthusiastic populace.

When Pompey returned from his expedition he gave a circus occupying five days, during which twenty elephants and five hundred lions were killed. The Roman voters expected candidates for office to give extensive circus games and to contribute otherwise to the comfort and amusement of the partisans. In modern times the circus became largely an exhibition of acrobatic displays, feats of horsemanship, collections of wild animals, and hippodrome performances. Associated with modern circuses are exhibitions of gymnastics, legerdemain, statuary, strange and foreign people, and bold feats of equestrianism. Phineas P. Barnum and William Cody are among the greatest showmen of modern times.

CISALPINE REPUBLIC (sĭs-ăl'pĭn), a state organized by Napoleon in 1797 and reorganized by Germany. It contained an area of 16,337 square miles and a population of 3,500,000. However, it received the name of Italian Republic on Jan. 25, 1802, when Napoleon was chosen its president. It was a part of Italy from 1805 to 1814, and was given to Austria in 1815 by the congress of Vienna as the Lombardo-Venetian kingdom.

CISTERCIANS (sĭs-tĕr'shanz), an order of monks and nuns founded in 1098 by Saint Robert, abbot of Molesme. It is properly a branch of the Benedictine order and its members are sometimes called Bernardines. The name Cistercians was derived from Citeaux, France, near Dijon, where the first monastery was established. Originally they wore a brown habit, but later adopted a white one supplied with a

black scapular. Their monasteries were established chiefly in lonely valleys. They refrained from eating meat, worked hard and slept little, and cultivated an interest in art and literature. This order was well organized in England when Henry VIII. dissolved the monasteries, but at present it is represented by only a few monasteries in Austria and Belgium, and by one in England and two in Ireland.

CISTERN (sĭs'tĕrn), a reservoir for water, usually constructed underground, and frequently supplied with a filter to purify the inflow. A cistern receives its water by an artificial channel, which is generally connected with the roof of a house or barn by means of spouting. The construction is chiefly of brick laid in cement and plastered on the inside to prevent the escape of water through the pores of the brick, but cheaper kinds are made by using wood or plastering with hydraulic cement directly upon the earthen walls. The purpose is to obtain soft water and store it as needed, but in arid districts cisterns serve to provide water for household use. Artificial reservoirs or tanks are constructed above the ground where the soil is extremely wet. Large cisterns are used for storage of water in manufacturing.

CITADEL (sĭt'â-del), the strongest part of a fortification, intended as the last defense of a garrison against a besieging army. Citadels are usually supplied with two gates, one communicating with the city and the other with places that furnish supplies for the army in case of siege. They command the fortifications and frequently hold out against an enemy even after the city they are intended to protect has surrendered. When William III. of England besieged Namur in 1695, the citadel held out a month after the town had surrendered.

CITIES OF REFUGE, the cities of Canaan in which those guilty of involuntary homicide could flee for safety. Six of the forty-eight Levitical cities belonged to this class, including Shechem, Kedesh, and Hebron, on the west side of the Jordan; and Golan, Bezer, and Ramoth-Gilead, on the east side. They were located so refugees could reach them from all parts of Palestine. Once in the City of Refuge, the accused was given a fair trial. If found innocent of willful murder, he remained until the death of the high priest, when he was released and permitted to return to his former residence.

CITIZEN (sĭt'ĭ-z'n), a member of a state or political community. An alien may become a citizen by naturalization, when he is known as a *naturalized* citizen. On the other hand, one born within the jurisdiction of the country is termed a *natural-born* citizen. In most monarchies it is customary to limit the term *citizen* to the residents of a municipality, while the word *subject* expresses the relation of citizenship to the state or country. A citizen of the United States is a citizen of the State in which he resides. A person may be and usually is a citizen both of the nation and of the State, but his rights under the two are legally different. A resident of a Territory is not a citizen of a State, but is subject to the Federal law. In some states residents are admitted to citizenship in the State, while not eligible to citizenship in the nation. Minors and women are citizens, but the right to vote is withheld from them, though in some states women are granted full privileges, as in Colorado, Wyoming, Utah, Idaho, New York, California, Kansas, etc.

CITIZENSHIP, the state of being vested with the rights and privileges of a citizen. In the United States citizenship is extended to all individuals born in the United States, and not subject to any foreign power, except untaxed Indians. Children born elsewhere, but whose fathers were citizens at the time of their birth, are citizens. Women, not citizens, become citizens by marriage to citizens. All persons naturalized are citizens. The Indians who withdraw from tribal relations and enroll as taxpayers become citizens. All classes of foreigners, with a few exceptions, who prove good behavior and moral character, may be naturalized after five years' residence within the United States. The laws expressly prohibit Chinese, Japanese, and Burmese from becoming citizens.

CITRIC ACID (sĭt'rĭk), an acid obtained from the fruit, roots, and leaves of a number of plants. It is derived largely from the juice of lemons. In preparing it the juice is allowed to ferment, after which it is neutralized with lime, then filtered, and afterward decomposed with sulphuric acid. About five pounds of citric acid are obtained from one hundred pounds of lemons. Among the common plants that yield citric acid are gooseberries, huckleberries, tobacco, grapevines, and sugar beets. The crystalline salts known as nitrates are obtained by combining metals with citric acid. Citric acid is used in treating rheumatism, for effervescent drinks, and in calico printing to prevent the formation of colors not wanted.

CITRON (sĭt'rŭn), a tree common to the warm, temperate, and tropical climates, where it is cultivated for its fruit. It has short and stiff branches, purple flowers, oblong leaves, and large warted fruit. The citron tree was brought from Media by the Romans. It furnishes oil of citron, which is used in confectionery and for culinary purposes. The name *citron* is applied to a variety of watermelon, the rind of which is used for pickles and preserves. It is very hard and inedible, and thrives in most parts of North America.

CITRUS (sĭt'rŭs), a genus of evergreen shrubs and trees native to warm climates, where they are cultivated for their fruit. These plants include the lime, orange, citron, lemon, and grape fruit, or shaddock. In most species the leaves are pointed and have jointed petioles. A volatile oil is obtained from all the species,

used largely in the manufacture of medicine and perfumery. The flowers are peculiarly fragrant and yield a volatile oil, and the fruit is pulpy with smooth seeds and spongy rind.

CITY, the name usually applied to a large aggregation of population, the term generally denoting a more populous place than a town. In some states the name is applied to any incorporated town, but in others it is limited to a town having not less than 10,000 inhabitants, and some apply it to a town having at least 2,000 inhabitants. A city in Canada is a municipality of the highest class and is separated from the jurisdiction of the county council. In Great Britain the term is generally applied to all towns that are incorporated and which either are or have been sees of bishops. The larger cities of Greece more nearly resembled a *state* than a *city,* as was the case in Athens and Sparta, and this form of organization is perpetuated in the free cities of Germany.

CIUDAD BOLIVAR (sē-o͝o-thäth′ bō-lē′-vär), a city in Venezuela, capital of the state of Bolivar, on the Orinoco River. The site is about 185 feet above the level of the sea, but the city is well built and contains many substantial structures. They include a theater, a college, and the governor's palace. In the cemetery are a number of fine monuments, including one of Bolivar. The city ranks as one of the four largest ports of Venezuela and has a large trade in coffee, sugar, rubber, hides, and asphalt. It was founded in 1764 and was known as Angotura until 1819, when its name was changed in honor of Simon Bolivar. Population, 1916, 11,758.

CIUDAD REAL (rä-äl′), a town in Spain, capital of the province of Ciudad Real, about one hundred miles south of Madrid. It is surrounded by a fertile plain, five miles south of the Guadiana, and has railroad conveniences. Among the chief buildings is a hospital founded by Cardinal Lorenzand. It has several monasteries and churches and is the headquarters of the Hermandad, or Holy Brotherhood. The manufactures include leather, woolens, flour, and olive oil. It was founded in the 13th century by Alfonso X., who fortified it as a strategic point. Population, 1916, 15,568.

CIUDAD VICTORIA (vēk-tō′rē-ä), a city in Mexico, capital of the state of Tamaulipas, 160 miles southeast of Monterey. It is surrounded by a sugar-growing district, has railroad facilities, and is a market for fruit and sugar. It is the seat of a bishop and the residence of several consular agents. The manufactures include cigars, sugar, clothing, and machinery. It was founded in 1750 and received its present name in 1825. Population, 1916, 16,810.

CIVET (sĭv′ĕt), a carnivorous mammal of Asia and Africa, resembling somewhat the fox and the weasel. The head is long, the ears are short and rounded, and the color is grayish with a tinge of yellow. The body is from three to four feet in length, including the tail, and about twelve inches high. Several species have been described, but the African civet is the best known. It feeds on birds, reptiles, and small quadrupeds, and is regarded a benefactor in the valley of the Nile for its ability to devour the eggs of the crocodiles. From it



AFRICAN CIVET.

is obtained a fatty substance known as civet. It is a pale-yellow or brownish substance, about the consistency of honey, and is secreted by the anal glands of this animal. It is removed from the bag about twice a week with a small spoon, and after being cleaned has a value of $10 or $12 per ounce. It is used in making perfume. In many sections of Africa civets are kept for this product.

CIVILIZATION (sĭv-ĭ-lĭ-zā′shŭn), a term applied broadly to the culture of a people in contradistinction to those classed as barbaric or savage. A nation is considered civilized when a large proportion of its inhabitants have a high state of intellectual and moral development, and show evidences of increase with the advance of years. Civilization is the outgrowth of material prosperity, between which and the higher state there are frequent actions and reactions. The state of the society of the world exists at the present time with regard to form as barbarous, semicivilized, and civilized. Many scholars and writers believe that the present population of the earth sprung from Noah's family, and that he and all that constituted his household were far advanced in civilization. Others hold a contrary view, thinking that man has shown a systematic growth and development to higher conditions through the ages. This class assert that man originally occupied a barbarous state and that he has advanced from century to century until the present time, although it is admitted that there are some people and nations who have shown no advance, or have fallen back into the state of barbarism, if they ever possessed any degree of civilization.

The first stage of society seems to be a highly barbarous one, in which the food consists of fruits, roots, and fishes. In the second stage man is represented as a hunter, but passes into the state of a shepherd in the third, in which state wild animals are domesticated to avoid the uncertainty of the result in hunting. In the

fourth stage man becomes an agriculturist, and finally, in the last and highest stage, engages in manufacture and commerce. The possibility of civilizing all nations, abolishing wars, and inaugurating peace has long been a question of serious discussion.

The tendency to higher development seems equal only to the spirit of retrogression, and a nation once civilized may remain in that state only a few decades or centuries. If civilization had been a permanent institution, it would have matured into world-wide achievements from the stages attained in Assyria, Babylonia, Egypt, and the other ancient nations, and by this time have spread to every country. With the rise of civilization in Western Europe there came a period of retrogression in the East, and this, and other examples which might be cited, are evidence conclusive that the work of great physical, mental, and moral effort to make mankind better and wiser must be pursued with ever increasing intensity. However, climate, food, soil, and the aspects of nature are the principal causes of intellectual progress. Viewed from this standpoint, it is assumed that religion, literature, and governments are the products, not the cause, of civilization.

CIVIL SERVICE, the service of government which is distinguished from the military and the naval affairs. Government is separated into three branches—*legislative, judicial,* and *executive.* The legislative branch is representative of the people, and in it is vested the law-making power. The judicial branch interprets and gives meaning to the law, and establishes and administers justice. The executive branch is the law-enforcing power. Each of the three departments of government is more or less concerned with the civil service. Owing to much responsibility resting upon the different departments, the reform and improvement of this service in many countries has been long a question seriously considered. In the United States partisans often biased appointments to office, which led to inefficiencies and public criticism. Owing to this fact, a system has been established by which competitive examinations are provided for candidates, and the fitness of applicants is tested without regard to politics. Appointments are given to those showing the highest degree of fitness, and these are to remain in office during good behavior. By these means party politics are removed and the efficiency of public service is increased materially. The number of government offices which are now in the civil service list is about 500,000. Within recent years the appointment to office in many cities has been established upon this plan, which is generally called the *merit* or *competitive* system.

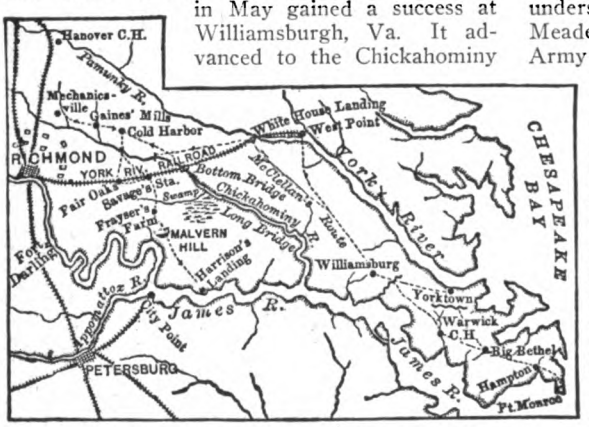
CIVIL WAR IN AMERICA, the armed conflict of 1861-65, between the Northern and Southern sections of the United States. Sectional differences had existed from the beginning of the Union, but after the time of the Missouri Compromise of 1820 the differences were based largely upon the economic and social divergence between the North and the South caused by the existence of slavery. Frequent tendencies to disrupt the government prevailed from time to time, but they increased materially after 1850, chiefly on account of the passage of the Fugitive Slave Law and the incidents connected with its enforcement. Other causes of dissatisfaction were the repeal of the Missouri Compromise in 1854, the Dred Scott Decision of the United States Supreme Court in 1858, the Lecompton Constitution for Kansas in 1858, and the John Brown Raid at Harper's Ferry in 1859. However, the election of Lincoln in 1860 brought disunion to a head. Seven states seceded between Dec. 20, 1860, and Feb. 1, 1861. These were Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina, and Texas. The Confederate States of America were organized on Feb. 4, 1861, at Montgomery, Ala., and the four states of Arkansas, North Carolina, Tennessee, and Virginia joined the Confederate States by July of the same year. Kentucky, Maryland, and Missouri were divided and were represented in both armies, while the western counties of Virginia remained loyal to the Union and later were organized as the State of West Virginia.

It was at first expected by many citizens of both sections that there would be a peaceable separation. Buchanan temporized and was succeeded by Lincoln, who at first could not see his course clearly, but when the Confederates fired upon Fort Sumter, in the harbor of Charleston, S. C., on April 12, 1861, it precipitated the conflict. President Lincoln immediately called for 75,000 volunteers to enforce the authority of the Union and declared a blockade on the coast of the Southern States. The Confederate States likewise called for volunteers and issued letters of marque and reprisal. The North was rich and had a greater variety of industries than the South, where agriculture was the only large industry. However, the people of the South were better united and were pervaded with a more enthusiastic military spirit.

The first blood was shed in Baltimore on April 19th in a street attack on the Sixth Massachusetts Regiment, which was on its way to Washington. It was followed by active operations in the western part of Virginia, which each of the contending parties tried to hold. The Federals were defeated on June 10 at Big Bethel, Va., and on July 21 occurred the first Battle of Bull Run, when the Federals under Gen. McDowell were completely defeated by the Confederates under Generals Johnston and Beauregard. The effect of the Confederate success at Bull Run was to encourage the South and raise a determined spirit in the North, and to unify both sections in support of their respective policies.

Though the experiences of the first year were decidedly against the Federals, their cause was greatly strengthened in 1862. Gen. Thomas succeeded in expelling a large part of the Confederate soldiers from Kentucky, while Pope, Buell, and Grant cleared the upper Mississippi and the lower Cumberland and Tennessee, with battles at Shiloh and Corinth, while Farragut captured New Orleans. Gen. Pope and Commodore Foote captured Island No. 10, in the Mississippi, and Maj. Gilmore bombarded and took possession of Fort Pulaski, near Savannah, Ga. In March of the same year the Confederate ironclad *Virginia,* formerly the *Merrimac,* was defeated in Hampton Roads by the newly constructed *Monitor.*

Richmond, the Confederate capital, was an objective point in 1862, and Gen. McClellan undertook its capture with the Army of the Potomac. This army was carefully organized and disciplined and took a position on the peninsula formed by the York and James rivers, and in May gained a success at Williamsburgh, Va. It advanced to the Chickahominy



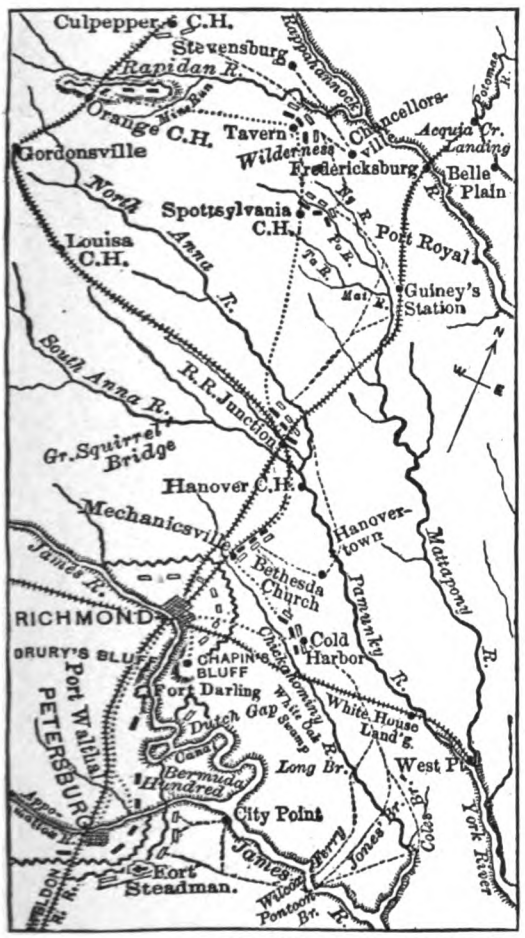
SCENE OF THE PENINSULAR CAMPAIGN.

and in June won the Battle of Seven Pines, or Fair Oaks, but the Federals were compelled to abandon the project after a hard-fought campaign of about four months, which included the Seven Days' Battles, known separately as those of Oak Grove, Mechanicsville, Gaines's Mill, Savage's Station, Frazier's Farm, and Malvern Hill. McClellan was superseded by Halleck in July and the contest was shifted to northern Virginia, where occurred the second Battle of Bull Run between the Federals under Pope and the Confederates under Lee, Longstreet, and Jackson, in which the Federals were defeated and driven back upon Washington. Lee now concluded to strike a master blow by crossing the Potomac into Maryland, but he was met at South Mountain by McClellan, who defeated him in the severe Battle of Antietam and compelled him to fall back into Virginia. In September Stonewall Jackson recaptured Harper's Ferry, where the Confederates took about 12,000 prisoners and valuable stores. The latter made an heroic effort to drive the Federals out of Kentucky and Tennessee, and Gen. Bragg with an army of 45,000 men entrenched himself at Perryville, where he was defeated by Rosecrans and Van Dorn was repulsed at Corinth. Buell, who had been commander of the Army of the Cumberland, was succeeded by Rosecrans, who engaged Bragg's army in a battle lasting three days at Murfreesboro, after which the Confederates retreated. Among the severe losses of the Confederates during the year was the death of Gen. Johnston, who fell at Shiloh, or Pittsburg Landing, on the Tennessee, in April.

The proclamation emancipating the slaves in the rebellious states, which had been decreed by President Lincoln in September, took effect Jan. 1, 1863. During the year the campaigns turned the tide in favor of the Federals. Hooker succeeded Burnside as commander of the Army of the Potomac, but was defeated in a great battle at Chancellorsville, where the Confederates lost Stonewall Jackson, and Lee understook the second invasion of Maryland. Meade succeeded Hooker as commander of the Army of the Potomac and immediately pursued the Confederates. The armies met at Gettysburg in July and fought desperately for three days with the result that the Federals gained a complete victory. Lee crossed the Potomac into Virginia and took a stand at the Rapidan. Meanwhile Gen. Grant undertook the capture of Vicksburg, which the Confederates had fortified, and Pemberton was compelled to surrender his army of 30,000 men almost the same time that the victory of Gettysburg was won. Port Hudson fell in July and gave the Federals complete control of the Mississippi, thus dividing the Confederacy into two sections. However, the Army of the Cumberland under Rosecrans was severely defeated by Bragg in the Battle of Chickamauga. Grant was now made commander of the Department of the Mississippi, which included all the armies of the West, and in November defeated Bragg at Chattanooga, in the battles of Lookout Mountain and Missionary Ridge. The year closed with the Federals in control of the Mississippi and in possession of the states of Arkansas, Florida, Kentucky, Louisiana, Mississippi, and Tennessee.

The ability of Grant in his remarkable campaigns in the West brought about his appointment as commander in chief of all the armies. In March, 1864, he took personal command of the armies in the East and placed Sherman in charge of the West and South. Sherman, with an army of 100,000 men, defeated the Confederates at Dalton, Rome, and Resaca, but was himself defeated at Kenesaw Mountain. He occupied Atlanta after it had been evacuated by Hood, who had succeeded Johnston, and two months later began his march to the sea, reach-

ing Savannah on Christmas. Hood had made a counter movement by invading Tennessee, but his army was destroyed by Thomas in the Battle of Nashville. Meanwhile, the Army of the Potomac, under immediate command of Meade, undertook the campaign of the Wilderness to force the ultimate evacuation of Richmond. The Battle of the Wilderness, near the Rapidan, was fought in May without either side gaining a victory. This was followed by the Battle of Spottsylvania Court House, the engagement at



SCENE OF THE CAMPAIGNS AROUND RICHMOND.

the North Anna River, and the repulse of the Federals at Cold Harbor. Grant now crossed the Chickahominy and was met by Lee at Petersburg, where he conducted a protracted siege. Gen. Early moved rapidly across the Potomac and won several successes, including that of the Monocacy, and then withdrew into the Shenandoah Valley, where he was defeated near Winchester by Sheridan and later was routed at Cedar Creek. In June of the same year the Confederate cruiser *Alabama* was sunk off Cherbourg, France, by the *Kearsarge* and Farragut defeated the Confederate squadron in Mobile Bay.

In February, 1865, Sherman left Savannah and marched through South Carolina, where he took possession of Columbia and Charleston, and pushed northward into North Carolina. Johnston undertook to check Sherman at Bentonville, though met with defeat in this design. Lee made an attempt on March 25th to break through the Federal line at the Appomattox River and captured Fort Stedman, but this was retaken by the Federals. Sheridan defeated the Confederates at Five Forks on March 31, thus exposing the connection of Lee with Richmond, and on April 2 Grant made an attack on the whole line at Petersburg. Richmond was immediately abandoned and Lee retreated to Lynchburg, where he was intercepted by Sheridan and surrendered his army to Grant at Appomattox Court House on April 9, while Johnston surrendered on the 25th. The last fight took place on the Rio Grande, May 13, 1865, and the last armed forces were surrendered by Kirby Smith on May 26. Jefferson Davis, President of the Confederate States, was captured on May 10 and confined at Fortress Monroe. At the time of the final victory, on April 14, President Lincoln was assassinated.

The Civil War, from April 12, 1861, when Fort Sumter was bombarded, to May 26, 1865, when the Trans-Mississippi army surrendered, covered a period of about four years. The Confederates had about 500,000 men and lost 95,000 in killed and wounded, while the Federals had 2,666,999 men and lost 359,258. It is not certain what number of Confederates were killed by accident or disease, but it is estimated that the total is nearly 200,000. The war cost the Confederate States about two billion dollars and the United States about three and one-half billion, and the latter has paid in pension to Union soldiers about as much as the sum spent by it to maintain the Union. It is estimated that the total cost, counting both sections of the country, aggregates nine billion dollars. See **Confederate States.**

CLAFLIN, Horace Brigham, philanthropist, born at Milford, Mass., Dec. 18, 1811; died at Fordham, N. Y., Nov. 14, 1885. He succeeded his father in business in 1831. The following year he opened a store in Worcester, and in 1843 removed to New York, where he engaged in the wholesale dry goods business. In 1864 he became head of the firm of H. B. Claflin & Co., whose business aggregated $72,000,000 a year. He was a prominent member of Beecher's church at Brooklyn, where he became known on account of his princely charities and assistance to promising young men. He was a strong advocate of the freedom of the slaves as early as 1850.

CLAIBORNE (klā'bôrn), **William,** colonist, born in Westmoorland, England, in 1589; died in Virginia in 1676. He was a descendant from

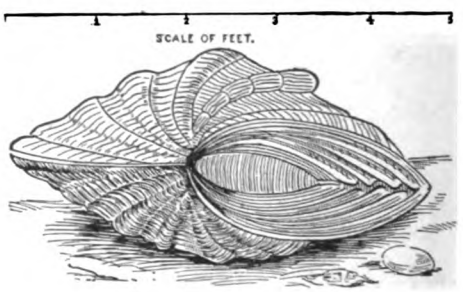
a distinguished family, became surveyor of the Virginia plantations under the London Company, and arrived in Jamestown in October, 1621. He acquired an estate of 45,000 acres. In 1625 he became secretary of state for the colony, and in 1628 was commissioned to make discoveries southward and open trade with the Indians. He settled and established a trading post on Kent Island in Chesapeake Bay, in 1631, and induced many settlers to locate on his lands. Lord Baltimore's first colony arrived at Saint Marie's in 1634 and claimed control over the Island of Kent, which resulted in a dispute, and the settlement of the island became a failure. He returned to England in 1637, joined the revolutionary party under Cromwell, and was appointed, in 1651, to proceed to America for the purpose of reducing Virginia and Maryland to submission. Accordingly, the government was overthrown and an administration of the Puritans was established in its stead, with Claiborne as secretary of state.

CLAIBORNE, William Charles Cole, statesman, born in Virginia in 1775; died Nov. 23, 1817. He studied law and removed to Tennessee, where he served as territorial judge. In 1796 he was a member of the convention that prepared the constitution of the State of Tennessee, was elected to Congress the following year, where he served two terms, and in 1802 became Governor of the Territory of Mississippi. The following year, when Louisiana was bought from France, he was one of the commissioners to take charge of that region, and in 1804 became its first Governor. He was elected Governor of Louisiana in 1812, when it was admitted as a State, and defended New Orleans, in conjunction with Gen. Jackson, against the British. He was elected a member of Congress in 1816, but did not take his seat on account of impaired health.

CLAIRVOYANCE (klâr-voi'ans), an alleged faculty or power claimed to be possessed by some persons while under the influence of mesmerism. By means of it the clairvoyant claims to be able to see mentally things concealed from sight or at a great distance, to discover things hidden from sight, and to describe clearly events happening at a distance. The claim that clairvoyance is a reality is not admitted by scientists. See **Mesmerism.**

CLAM, the name applied to various bivalve mollusks, which are most numerous in the sand and gravel between the high and low water mark. The best known species are the sea, or hen, of the Atlantic; the soft-shelled clam, called the cob in England; the edible giant clam of the South Sea; and the fresh-water clam, which is properly a mussel. The clam is a favorite food, while the shells are used in many cities to make ornaments, buttons, snuff boxes, knife handles, and beads. Off the East Indian coast the *giant clam,* weighing 500 pounds, is found.

CLAN, meaning offspring or children, the name applied to a tribe or number of families bearing the same surname, claiming descent from common ancestors, and united under a chieftain who represents that ancestor. The clan system still exists among the Arabs, Tartars, and other tribes of Asia and Africa, and among a number of other peoples, particularly among Indians. A clan system was instituted



GIANT CLAM.

among the people of Scotland in the reign of Malcolm II., about the year 1008, but it was of much greater antiquity in other countries. The members of a clan were kin by birth and were united by other ties under a chieftain, who was the supreme ruler. Each clan occupied a certain portion of the country, and wars among clans were both frequent and severe. The legal authority of clannish chiefs was abolished by a law passed in 1747, and the government became merged into a system more nearly subject to the central authority. During the period that clans flourished, they were divided into two general classes—those of the Highlands and the clans of the Borders.

CLAPP (klăp), **Moses Edwin,** lawyer and statesman, born in Delphi, Ind., in 1851. He studied at the University of Wisconsin and in 1873 was admitted to the bar. He built up a successful law practice in Saint Croix County, Wis., removed to Fergus Falls, Minn., in 1881, and ten years later removed to Saint Paul. In 1887-93 he was Attorney General of Minnesota, and succeeded Cushman K. Davis as United States Senator in 1901. He was reëlected to a full term in 1905.

CLAPPERTON (klăp'pĕr-tŭn), **Hugh,** African explorer, born at Annan, Scotland, in 1788; died at Changary, near Sokoto, Africa, April 13, 1827. He went to sea at the early age of seventeen years, and on account of distinguished services was appointed to the rank of lieutenant. He accompanied Col. Denham and Dr. Oudney on an exploring expedition into the interior of Africa. After reaching Tripoli, in 1822, he started to Bornu, and proceeded as far as Sokoto, but returned to England in 1825. He made a second voyage to Africa in 1826. Starting from the Bight of Benin, he again visited Sokoto, where he was detained by Sultan

Delo and died on account of hardships of the journey. He was the first European to penetrate from the Bight of Benin into the interior of Africa. Clapperton was an intelligent and unprejudiced observer, and through him geographical knowledge of Africa was greatly enlarged.

CLAREMONT (klâr'mŏnt), a town in Sullivan County, New Hampshire, forty-eight miles northwest of Concord, on the Boston and Maine Railroad. It is surrounded by a productive farming country and is a center of manufactures. The chief buildings include the Fiske Library, the high school, and a number of churches. Among its industries are cotton, woolen, and paper mills, printing, machine works, and marble yards. An abundance of water power is obtained from the Sugar River. Population, 1900, 6,498; in 1910, 7,529.

CLARENDON (klăr'en-dŭn), **Constitutions of,** a series of ordinances made by a council of the nobles and prelates in England, at the village of Clarendon, in Wiltshire, in 1164. These laws were favored by Henry II. as a means to check the power of the church and to limit the clergy in exercising secular jurisdiction. They limited and defined the jurisdiction of the Pope in England, and gave the crown power to interfere in the election to fill vacancies in offices and dignitaries. By their terms it became necessary to secure the consent of the king to make appeals to Rome, clergymen were forbidden to leave the realm without royal sanction, and clergymen accused of crime were taken for trial before ecclesiastical courts, after which the law courts were empowered to inflict further punishment.

CLARENDON, Edward Hyde, Earl of, statesman and historian, born at Dinton, England, Feb. 18, 1609; died at Rouen, France, in 1674. He was the son of a private gentleman, who provided for his education at Oxford. Subsequently he studied law under his uncle, Nicholas Hyde, then Chief Justice of the king's bench. He became a member of the Long Parliament and voted on the side of the popular party. In 1642 he attached himself to the royal cause and was appointed Chancellor of the Exchequer. He accompanied Prince Charles to Jersey, where he remained two years, and began his "History of the Rebellion." Soon after he wrote various papers in which he discussed a number of important acts of Parliament. He went to Paris in 1648, and the next year proceeded to Spain to secure aid for Charles II. at the Spanish court, but his mission proved unsuccessful. In 1657 he was appointed High Chancellor of England by Charles II. At the Restoration his appointment was confirmed, and later he was made chancellor of the University of Oxford. In 1663 he was accused of high treason in the House of Lords and was blamed for the ill success of the war with Holland and the transfer of Dunkirk to the French, besides other unpopular measures. He was impeached for high treason in 1667 and spent the closing years of his life in exile. His body was taken from Rouen to England and buried in Westminster Abbey. Though an exemplary citizen in many respects, he lacked firmness and enthusiasm as an official. Ben Jonson was his companion in youth and his life-long friend.

CLARENDON, George William Frederick Villiers, Earl of, statesman, born in London, England, Jan. 12, 1800; died June 27, 1870. He studied at Cambridge, entered the diplomatic service, and was appointed ambassador at Madrid in 1833, where he attained influence in aiding the Spanish government to be established on a constitutional basis. In 1838 he returned to England and became a member of the House of Lords. He was appointed Keeper of the Great Seal in 1840, and supported Sir Robert Peel in abolishing the corn laws. In 1846 he was made president of the board of trade and Lord Lieutenant of Ireland the year following. His official service in Ireland began during troublous times, but tranquillity was restored by his prompt and decisive measures. He was placed at the head of the foreign office in 1853, and during his administration the Crimean war marked an important period in European history.

CLARINET (klăr'ĭ-nĕt), or **Clarionet,** a wind instrument with a reed, first made by John Christopher Denner of Leipsig, Germany, in 1690, but since modified by various improvements. Its principal parts include a mouthpiece, furnished with a single beating reed, and a round tube enlarged at the end in the form of a bell. The tube is provided with eighteen openings in the sides, half of which are closed by the fingers and half by the keys. It is used extensively in military bands and orchestras. Its compass is much greater than that of the flute and its music is held in higher favor.

CLARK, Alvan, optician, born in Ashfield, Mass., March 8, 1808; died in Cambridge, Aug. 19, 1887. He was the son of a farmer, became an engraver, then a portrait painter, and in 1845 a manufacturer of telescopes. He ranks among the principal manufacturers of large achromatic lenses. The first large order he received was for an eighteen-inch object glass for the University of Mississippi, and in 1870 he began a twenty-six-inch glass for the naval observatory at Washington. The Russian government placed an order with him in 1879 for a thirty-inch glass for the imperial observatory at Pultowa. Another large glass was made for the University of Virginia, and a thirty-six-inch object glass for the Lick Observatory in California, in 1886.

CLARK, Alvan Graham, son of Alvan Clark, born at Fall River, Mass., July 10, 1832; died June 9, 1897. He was educated at the public schools in Cambridge and learned the trade of a machinist. Later he worked with his

brother in East Cambridge at lens making, and became a member of the firm of Alvan Clark & Sons, telescope makers, in 1852. In 1870 he went to Spain to observe a total eclipse, and eight years later went to Wyoming for the same purpose. He was awarded the gold medal from the Academy of Science of France in 1862 for his discovery of the companion star of Sirius. He made several improvements in telescopes, and in 1894 completed the forty-inch glass for the University of Chicago. The telescope in which this glass was placed cost $500,000, and is now in Yerkes Observatory, Geneva, Wis.

CLARK, Champ, lawyer and statesman, born in Anderson County, Ky., Mar. 7, 1850. He studied in the public schools and afterward attended Kentucky University and Bethany College. Subsequently he studied law at the Cincinnati Law School and in 1873-74 was president of Marshall College, W. Va. He removed to Louisiana, Mo., where he was city attorney, and later served as prosecuting attorney in Pike County. In 1892 he was elected to Congress as a Democrat, serving one term, and was again elected to Congress for terms beginning in 1897 and ending in 1919. He was chairman of the Democratic national convention at Saint Louis in 1904, and served several terms as speaker of the house of representatives. In 1912 he was prominent as a candidate for President.

CLARK, Charles Heber, author, born in Berlin, Md., July 11, 1841. He attended the University of Georgetown, D. C., and in 1865 engaged in journalism, writing largely under the pseudonym of Max Adeler. For ten years he was secretary of the Manufacturers' Club in Philadelphia, Pa., and edited the official organ of that association. His writings include many editorials and contributions on economic subjects, while his books are chiefly humorous. They include "In Happy Hollow," "Desperate Adventures," "The Quakeress," and "Out of the Hurly Burly." He died August 10, 1915.

CLARK, Francis Edward, clergyman and author, born in Aylmer, Quebec, Sept. 12, 1851. He graduated at Dartmouth College in 1873 and studied in Andover Theological Seminary. In 1876 he was chosen pastor of a Congregational church at Portland, Me., and in 1883 was called to a like position in South Boston. He organized the Williston Young People's Society of Christian Endeavor and was president of the United Society of Christian Endeavor. His "A New Way Around the World" is an interesting account of a trip on the Trans-Siberian railway. Among his writings are "World-wide Endeavor," "Fellow-Travelers," "The Everlasting Arms," "Looking Out on Life," and "Training the Church of the Future."

CLARK, George Rogers, soldier and pioneer, born near Monticello, Va., Nov. 19, 1752; died Feb. 18, 1818. He became a surveyor and settled in the valley of the upper Ohio River. In 1774 he served against the Shawnees and the following year settled in Kentucky, which he helped to organize as a county of Virginia. In 1777 he undertook the conquest of Illinois, which was then occupied by the French and had a number of British outposts. He captured Kaskaskia and compelled the British at Vincennes to capitulate, and subsequently conducted a campaign in Ohio and Virginia. In 1782 he destroyed several Indian settlements on the Miami and Scioto, was raised to the rank of brigadier general of Virginia militia, and in 1793 accepted a commission in the French army against the Spaniards, who held a number of districts on the Mississippi. Though his services were of great value to the United States during the Revolution, he died in poverty.

CLARK, Jonas, patriot and clergyman, born in Newton, Mass., Dec. 25, 1730; died in Lexington, Nov. 15, 1805. He graduated at Harvard in 1752 and became pastor of a church in Lexington, where he spent his entire life. He rendered valuable services in the Revolutionary War, and near his house the first blood was shed on April 19, 1775. When he saw the dead patriots he exclaimed, "From this day will be dated the liberty of the world."

CLARK, Latimer, electrical engineer, born at Great Marlow, England, March 10, 1822; died Oct. 30, 1898. He began railway engineering at the age of twenty-five years, and with his brother Edwin was engaged in connection with the construction of the Britannia tubular bridge over the Menai Strait. Soon after he entered the employ of the Electrical Telegraph Company, with which he held positions a number of years. In 1853 he was the discoverer of the fact that low tension and high tension currents travel at the same rate. He became engineer to the Atlantic Cable Company in 1859. In 1861 he read a paper before the British Association, in which he suggested the familiarly known *ohm, farad,* and *volt* as electrical terms. He originated what is known as the *Clark's standard cell,* and superintended the submergence of over 100,000 miles of cables in different parts of the world. Among his published works are "Description of the Britannia and Conway Bridges," "Electrical Tables and Formulas," "Treatise on Electrical Measurements," and "Dictionary of Electrical Measures."

CLARK, William, soldier and explorer, born in Caroline County, Virginia, in 1770; died in 1838. He removed to Kentucky in 1784, settling on the site of Louisville, and entered the army for service against the Indians. Ill health caused him to resign in 1796, but he reënlisted and was commissioned a second lieutenant in 1803. President Jefferson appointed him to accompany Meriweather Lewis on the famous expedition to the mouth of the Columbia River, which they reached in 1805. In 1813 he was made Governor of the Territory of Missouri, serving until 1821, and subsequently served as

superintendent of Indian affairs at Saint Louis, from 1822 until his death.

CLARK, William Andrews, capitalist and politician, born in Connellsville, Penn., Jan. 8, 1839. At an early age he went to Iowa and studied law at Mount Pleasant, and in 1863 drove a team of oxen to Montana, where he became wealthy. His investments were largely in manufacturing, mining, and banking, and he was at one time the largest owner of copper mines in the world. At the Montana constitutional convention, in 1889, he was president, and the following year was an unsuccessful nominee for United States Senator. He was elected to the United States Senate in 1899, but his election was held illegal and the Governor appointed him to fill the vacancy. Later the appointment was declared invalid and he was elected for the term ending in 1907. He traveled extensively in America and Europe, and was prominent in advocating the extension of transportation and commercial facilities of the Pacific coast states.

CLARK, William Robinson, educator, born in Inverurie, Scotland, Mar. 26, 1829. He studied at Aberdeen and Oxford, entered the ministry of the Church of England, and was made prebendary of Wells in 1870. In 1882 he became professor of philosophy in Trinity College, Toronto, where he labored with marked success more than twenty-five years, exerting a wide influence upon the educational affairs of Canada. He was made Baldwin lecturer in the University of Michigan in 1887 and Slocum lecturer of the same institution in 1899, and was president of the Royal Society of Canada in 1900. His publications include "Witnesses to Christ," "The Anglican Reformation," "Pascal and Port Royal," "The Four Temperaments," and "Savonarola: His Life and Times."

CLARKE, Charles Cowden, author, born at Enfield, England, Dec. 15, 1787; died Mar. 13, 1877. He began his career as a bookseller in London and delivered courses of lectures on poets and dramatists from 1834 until 1854. His wife, Mary Cowden Clarke, aided him in annotating an edition of Shakespeare and in compiling "The Shakespeare Key." Among his books are "Tales from Chaucer," "Recollections of Writers," "Molière Characters," and "Shakespeare Characters."

CLARKE, James Freeman, clergyman, born at Hanover, N. H., April 4, 1810; died at Jamaica Plain, Mass., June 8, 1888. In 1829 he graduated at Harvard and four years later at Cambridge Divinity School, and became pastor of the Unitarian Church in Louisville, Ky. He published the *Western Messenger* at Louisville from 1836 till 1839. He founded the Church of the Disciples at Boston in 1841, and was its pastor until 1886. Clarke was widely known as a lecturer and writer. Among his best known works are "The Doctrine of Christianity," "Eleven Weeks in Europe," "Self-Culture," "The Doctrine of Atonement," and "Orthodoxy: Its Truth and Errors."

CLARKE'S FORK, a river of the United States, rises in the Rocky Mountains, in the western part of Montana. It flows toward the northwest in Montana, crosses the northern part of Idaho, flows through the northeastern corner of Washington, and enters the Columbia River in British Columbia, near Waneta. It is about seven hundred miles long and has abundant water power. Its headwaters are the Flathead and Missoula rivers, by which it is formed, and it passes through Lake Pend Oreille, in Idaho.

CLARKSBURG, county seat of Harrison County, West Virginia, 98 miles southeast of Wheeling, on the Monongahela River and on the Baltimore and Ohio Railway. The surrounding country produces coal, gas, and oil. It has manufactures of tinplate, glass, and pottery. The buildings include the high school, court house, and federal building. It was settled in 1774 and incorporated in 1785. Population, 1910, 9,201.

CLARKSVILLE, a city in Tennessee, county seat of Montgomery County, on the Cumberland River, and on the Louisville and Nashville Railroad. The chief buildings include the courthouse, the city hall, and the Southwestern Presbyterian University. Iron mines are worked in the vicinity. It has a large trade in tobacco and merchandise. The manufactures include cigars, clothing, earthenware, and machinery. The city is improved by electric lights, pavements, waterworks, and a sewer system. It was settled in 1780 and incorporated in 1785. Population, 1900, 9,431; in 1910, 8,548.

CLARK UNIVERSITY, an institution of learning founded by Jonas Gilman Clark (1815-1900) in 1887, at Worcester, Mass. It has a library of 25,000 volumes. The chief publications are the *Mathematical Review* and the *American Journal of Psychology.* G. Stanley Hall was its president for many years.

CLASSICS (klăs'sĭks), the writers and productions of acknowledged excellence and authority. The highest class of Roman citizens were called *classici* and a man of the highest rank was termed a *classicus.* The term *classic* was applied to writers and productions as early as the 2d century after Christ. At present it refers to the best writers and productions of Greece and Rome and to the modern works that conform to the best and most perfect standards.

CLAUDE LORRAINE (klạd lŏ-rān'), landscape painter, born in Lorraine, Germany, in 1600; died in Rome, Italy, in November, 1682. He lived with his brother, an engraver of wood, at Freiburg, went to Naples, and later was employed at Rome by the painter Agostino Tassi to do household drudgery and grind his colors. Subsequently he studied under Godfrey Waats at Naples and spent some time traveling through Italy, Germany, and France, settling at Rome

in 1627. He soon attracted attention by his landscape paintings. Many of his productions are still in the art galleries of France, Germany, Italy, and Spain, and a number are in England. His most noted painting is the "Villa Madama," which he kept as a model, and even refused to sell it to Pope Clement IX. when he was offered an enormous price. His works have commanded high prices, even during the artist's life, for he set a high price on his productions. He was an indefatigable student of nature, was earnest, and possessed much inventive power. He watched the sunlight at various hours of the day, the dewy moisture of morning shadows, the effect of the wind on foliage, and the magical blending of the horizon, and gathered inspiration from these and similar phenomena. His best productions, besides "Villa Madama," are "Twilight," "Morning," "Noon," and "Evening."

CLAUDIUS (klą'dĭ-us), **Tiberius,** Roman emperor, youngest son of Nero Claudius Drusus, born at Lyons in 10 B. C.; died from poison in 54 A. D. During his early life he was sickly and infirm. His education was neglected and cared for principally by freedmen and women. Caligula was less cruel to him on account of his supposed imbecility, but he made considerable progress in Latin, Greek, and historical studies. When Caligula was assassinated, he was found in concealment by the soldiers, who carried him forth and proclaimed him emperor. His recognition was compelled by the praetorians. At first his rule was marked by mildness and justice, but he was led by his wives, for he married four times, to acts of cruelty and extortion. His armies were sent abroad and conquered large portions of Germany, and later undertook a conquest of Britain. Mauritania was proclaimed a Roman province by the conquering armies. He made a number of internal improvements, including the famous Claudian aqueduct, which occupied 300,000 laborers for eleven years. His last wife was Agrippina, who poisoned him in 54 A. D. in order to secure the throne for her son Nero. The memory of Claudius was held sacred by the Romans, and he was deified among the most celebrated.



CLAUDIUS.

CLAY, a term applied to any form of earth which possesses sufficient plasticity to be fashioned like paste by the hand or the potter's lathe, when moistened with water. It is produced by the disintegration of rocks. Streams carry silt, which forms clays when deposited. When currents pass into still waters, the heavier stones drop first, next the pebbles, and then the gravel and sand, and finally the fine silt settles to the bottom and forms clay or mud. The mud, hardened by drying, becomes shale. The purest grade of clay is known as *kaolin,* of which porcelain and white earthenware are made. *Pipe clay* is a plastic and smooth clay and *flint clay* is hard and dense. *Fire clay* is found in coal measures immediately beneath the several veins of coal. It constitutes the soil of the ancient forests, the remains of which have been transformed into coal. It is used to make infusible brick. Other clays are used for making drain and sewer tile, brick, earthenware, tobacco pipes, and many other products. *Loam* is a mixture of sand and clay, *marl* contains clay and shell remains, and *shale* is a rock clay. Calcareous clay lands produce the best wheat and rye, while the rosaceous produce the best fruits. Clay is an important constituent of good soil. The manufactured products of clay produced annually are very extensive.

CLAY, Alexander Stevens, lawyer and statesman, born in Cobb County, Ga., Sept. 25, 1853. He lived on a farm and attended the public schools, and subsequently studied at Hiawassee College, where he graduated in 1875. Subsequently he taught school, was admitted to the bar, and in 1884 became a member of the Legislature of Georgia, of which he was speaker in 1886. He was elected State Senator as a Democrat in 1892 and attained to a position of influence, and in 1897 was chosen United States Senator and was reëlected in 1903. He served on numerous committees and was a leader of his party in legislation. He died Nov. 13, 1910.

CLAY, Cassius Marcellus, statesman, born in Madison County, Kentucky, Oct. 19, 1810; died July 22, 1903. He graduated at Yale College in 1832, where he was influenced to become an abolitionist and freed his own slaves, after hearing a speech by William Lloyd Garrison. He attained eminence in the practice of law and was elected to the Legislature in 1835 and was reëlected in 1837 and in 1840. He supported Henry Clay for President and opposed the annexation of Texas. For some time he published the *True American* at Lexington, in which he advocated the abolition of slavery. While serving in the Mexican War, he was taken prisoner. He favored the election of President Taylor, and supported Frémont in 1856 and Lincoln in 1860. He was sent as minister to Russia in 1861, but returned to America in 1862 and was made major general of volunteers. Later he served as minister to Russia a second time, from 1863 to 1869. In 1870 he aided the revolutionary movement in Cuba. He supported Horace Greeley in 1872, Samuel J. Tilden in 1876, and James G. Blaine in 1884. In 1894, at the age of eighty-four years, he married a seventeen-year-old ward of a poor family, in which he was opposed by his sons. Another interesting event of his life was an indictment for killing Perry White, a Negro, in 1877, who was a discharged servant, but he was acquitted by the jury.

CLAY, Henry, orator and statesman, born in Hanover County, Virginia, April 12, 1777; died June 29, 1852. He was the son of a Baptist minister who died when he was five years old, and his education was largely in the hands of his mother. He worked on the farm in early boyhood, and obtained a position in the office of clerk of the courts at the age of fifteen years. Later he entered a law office, was admitted to the bar in 1797, and commenced to practice at Lexington. His remarkable ability as a speaker attracted much attention, which hastened his success and brought a flourishing practice. He was elected to the State Legislature in 1803 and three years later to the United States Senate. Later he became a member of the Legislature of Kentucky and was chosen its speaker in 1808. A speech made on an important occasion caused a duel between him and a fellow-member, in which both parties were slightly wounded. He was elected to the national House of Representatives in 1811, serving as its speaker, and subsequently held the latter position four times. His energies were bent toward internal improvements, the building of roads, canals, and public buildings, being classed as a "loose constructionist of the Constitution." He was instrumental in forcing Madison into the war with Great Britain, and gave that movement ardent support. In 1813 he was chosen one of the envoys to treat for the peace finally negotiated at Ghent in December, 1814. While on this mission in Europe, in 1815, he was again elected to Congress and served continuously as its speaker until 1825. During his service in Congress he delivered a number of noted speeches in favor of the independence of the Spanish-American states of South America, which were in a state of revolution against Spain. When the war broke out between Greece and Turkey, in which the former sought freedom, he was an eager advocate of Grecian liberty.



HENRY CLAY.

In 1824 Clay was a candidate for the Presidency, but failed, receiving only thirty-seven electoral votes. The contest was among four candidates and for want of a constitutional majority the election went to the House, where he supported John Quincy Adams, which caused a duel between him and John Randolph. Clay became Secretary of State under President Adams. During the administration of this office he had in charge many matters of diplomacy, including the questions brought on by the Panama Congress. He was again nominated for the Presidency in 1832, and was beaten by Jackson, and a third time, in 1844, and was beaten by Polk. However, he continued as an active leader of the Whigs, and, like many other prominent men and leaders, he failed in securing popular support largely on account of his prominence in statesmanship.

Clay reëntered the United States Senate in 1849 and took the foremost part in the compromise bill of 1850, known as the Omnibus Bill. On account of this measure and various others he won the title of the "great pacificator." The Missouri Compromise was likewise advocated by him. This bill abolished slavery in all the states north of latitude 36° 30′, permitted it in Missouri, and with several other measures sanctioned slavery in the slave states. The Omnibus Bill provided that the states of New Mexico and Utah should be left to their own discretion as to slavery, and California should be taken into the Union as a slave State, while the slave trade should be abolished in the District of Columbia. He at first opposed the establishment of a national bank, but later favored it and spoke vigorously in its behalf. He is preëminent as a debater, a powerful platform orator, and a contriver of various compromise measures intended to preserve the Union. No man of his party had a larger following of personal friends, and no one ranks higher in the period often referred to as the age of American oratory.

CLAYTON (klā′tŭn), **John Middleton,** jurist, born in Dagsboro, Del., July 24, 1796; died in Dover, Del., Nov. 9, 1856. He graduated at Yale in 1815 and was admitted to the bar. He was elected to the Legislature in 1824 and to the United States Senate in 1829 and 1835, and served as Secretary of State under President Taylor. In 1845 he was again elected to the Senate and was reëlected in 1851. As an orator he took high rank. His name is connected with the Foote resolution and the Clayton-Bulwer Treaty.

CLAYTON, Powell, soldier and statesman, born in Bethel, Va., Aug. 7, 1833. He studied civil engineering at Wilmington, Del., and in 1855 went to Kansas. In 1859 he was made civil engineer at Leavenworth and entered the Union army at the beginning of the Civil War, rendering efficient service in Arkansas and other states of the Southwest. In 1868 he was chosen Governor of Arkansas, served in the United States Senate as a Republican in 1871-77, and attended all the national Republican conventions from 1872 until 1896. President McKinley appointed him minister to Mexico in 1897.

CLAYTON-BULWER TREATY (bŭl′wĕr), a treaty between the United States and Great Britain, relating to the construction of a ship canal between the Atlantic and Pacific oceans, across the Isthmus of Panama. It received its name from the commissioners, John Middleton Clayton, on behalf of the United States, and Bulwer-Lytton (later Lord Dalling), on the part of Great Britain. It was

ratified in 1860. The terms include that neither nation is to erect fortifications at or near the canal, and that these nations will not assume dominion over any part of Central America. However, the treaty was abrogated in 1901, when the Hay-Pauncefote Treaty was concluded between the two nations.

CLEARFIELD, a borough of Pennsylvania, county seat of Clearfield County, 170 miles northeast of Pittsburg. It is conveniently located on the west branch of the Susquehanna River and on the Pennsylvania and other railroads, and is surrounded by a fertile agricultural country, which contains deposits of coal, fire clay, and limestone. The manufactures include flour, leather, and machinery. It has electric lights, waterworks, and other municipal utilities. The first settlement in its vicinity was made in 1805 and it was incorporated in 1840. Population, 1900, 5,081; in 1910, 6,851.

CLEARING HOUSE, a banking institution which serves to make mutual payments between bankers on drafts and checks. Clearing houses are organized by an association of banks. The different drafts and checks received by the associated banks are brought to the clearing houses and offset one another, and only the balances are paid in money. Each bank represented has a desk at the clearing house, at which the settling clerk or clerks receive in bundles the checks and drafts payable by the bank they represent, and in return draw a statement of the demand against other banks. All the checks and other evidences of credit are noted carefully by an inspector and the separate items are examined and approved, after which the checks are returned to the respective banks by their clerks, and at a stated time the debtor banks pay to the creditor banks the balances. Clearings are made every business day, usually about 11 A. M., and the transactions are subject to revision or rectification, not at the clearing house, but in the form of verified claims filed on the succeeding day or some time later.

Clearing houses were established in France as early as 1667, the first at Lyons, but the present system did not originate until the latter part of the 18th century. The London Clearing House, established about 1775, is one of the oldest. New York City has the most important clearing house in America, established in 1853, and its average daily clearings aggregate about $22,500,000 and the average daily payments approximate one million dollars. Chicago has the second largest clearing house in the United States, its annual clearings amounting to twelve billion dollars, while the annual clearings in New York City aggregate ninety billion dollars. Other important clearing centers are located at Boston, Saint Louis, Philadelphia, Cincinnati, San Francisco, and Kansas City. The chief clearing houses of Canada are at Montreal, Toronto, Quebec, and Vancouver.

CLEAVAGE (klēv'āj), in geology, the direction or manner in which rocks may be split into parallel layers. The direction of planes or cleavage is frequently in the line of stratification, but differs from it in many instances. It is not difficult to determine the structure of crystallized bodies when they are broken, and on examination it is found that small polyhedrons make up the individual fragments. The phenomenon of rock cleavage is not easily determined. Some writers consider that it is due to the pressure of mechanical forces to the planes of cleavage, while others look upon it as the result of crystalline agency. Nearly all species of rock are subject to cleavage, but those of the finer grains show it to the best advantage. Slate and schist are names applied to rocks which possess the property of cleavage.

CLEBURNE (klē'bûrn), a city in Texas, county seat of Johnson County, forty-eight miles southwest of Dallas, on the Missouri, Kansas and Texas, the Gulf, Colorado and Santa Fé, and other railroads. The chief buildings include the county courthouse, the city hall, and a public library. It is the seat of a college and has a fine high school. The manufactures include ice, farming utensils, and machinery. It has electric lighting, waterworks, and sewerage systems. Population, 1900, 7,493; in 1910, 10,364.

CLEMATIS (klĕm'ā-tĭs), a genus of plants either herbs or shrubs, usually having climbing stems. They are widely distributed throughout the different climates, but are most numerous in the Temperate zones. Many of the species now cultivated have been obtained from plants native to Europe and have large flowers of various colors, often six inches across. The root of a clematis is used by the American Indians as a stimulant to revive horses that are overcome at races. A number of different kinds are cultivated in gardens and greenhouses of Europe and America as ornamental flowering plants.

CLEMENCEAU (klā-män-sō'), **Eugene,** statesman, born at Vendee, France, Sept. 28, 1841. He studied medicine at Nantes and Paris, and practiced in the working districts of the latter city. In 1870 he became a member of the commission of communal education, and in 1871 was elected representative to the assembly for the department of Seine, supporting the side of the radicals. He was shut up in both sieges of Paris in 1870-71, and was suspected by the communists. As a radical he took an active interest in French politics during the presidency of Grévy. Later he helped to exclude the clergy from educational affairs and to expel the Jesuits; in the advocacy of this cause he published *La Justice,* a political newspaper. He married Mary G. Plummer, an American lady, in 1870. In 1898 he was a leading advocate for a revision of the Dreyfus case. He was elected to the Senate in 1902 and became Premier in 1917.

CLEMENS (klĕm'enz), **Samuel Langhorne,** well known as Mark Twain, humorist, born in Florida, Mo., Nov. 30, 1835; died, April 21, 1910.

He attended the schools at Hannibal, Mo., and became a printer, after which he traveled from town to town until he reached New York. Later he became a pilot on the Mississippi River steamboats, at New Orleans, and in 1861 went to Nevada as private clerk to his brother, who was secretary of the Territory. In Nevada he engaged in mining, and in 1862 accepted the editorship of the *Virginia City Enterprise*. In 1865 he engaged as a reporter on the *Morning Call* at San Francisco, and visited the Hawaiian Islands as news correspondent in 1866. He accompanied a party of tourists to the Mediterranean in 1867, visiting Egypt and Palestine, and on his return published "Innocents Abroad." No less than 125,000 copies of this publication were sold in three years. He became widely known as a humorist, lecturer, and entertainer, and traveled extensively in the United States, Canada, and England. In 1895 the French humorist, Max O'Rell, challenged him to fight a duel, by which he achieved some distinction.



SAMUEL L. CLEMENS.

Clemens founded the publishing house of Charles L. Webster & Co., in 1884, and brought out Gen. Grant's "Memoirs." When the firm failed in 1894, he started on a lecturing tour around the world with the design of achieving success and winning back his financial standing with his inimitable humor. Among his many productions is a series of articles in the *North American Review*, in which he criticised James Fennimore Cooper's novels. His general writings include "Joan of Arc," "Sketches Old and New," "Punch, Brothers, Punch," "Prince and the Pauper," "Huckleberry Finn," "A Yankee at King Arthur's Court," "Life on the Mississippi," "Gilded Age," "Roughing it," "The Tragedy of Pudd'nhead Wilson," and "A Double-Barreled Detective Story." The writings of Mark Twain are characterized by a pathos and sympathy which are both pleasing and instructive, while, at the same time, his humor points to a moral of superior traits.

CLEMENT (klĕm'ent), the name of fourteen popes, the first of whom was Clement Romanus, who is counted one of the apostolic fathers. See **Pope**.

CLEMENT XIV., Pope of Rome, son of a physician, born near Rimini, Italy, in 1705; died Sept. 22, 1774. He studied theology and philosophy at the age of eighteen years and successfully taught these branches. He was made counselor of the Inquisition by Benedict XIV. and became a cardinal under Clement XIII. On May 19, 1769, he succeeded the latter to the papal chair. In the interest of peace with Italy, Portugal, Spain, France, and Naples, he issued the famous brief, in 1773, by which the society of Jesuits was suppressed. His extensive learning, liberality of mind, and mildness of character made him remarkable and honored.

CLEOPATRA (klē-ō-pā'trȧ), the name of several princesses of Egypt, of the house of the Ptolemies. The best known is the daughter of Ptolemy Auletes. She was born in 69 B. C., and at the death of her father ascended the throne jointly with her younger brother Ptolemy. In accordance with Egyptian custom he was to be her husband and colleague. After a few years the guardians of her brother deprived her of all royal authority and she withdrew to Syria with the view of recovering her rights by force of arms. When she was about to return with an army from Syria, Caesar and Pompey were at war in Egypt. The personal charms of Cleopatra won Caesar and he placed her upon the throne. While in battle against Ptolemy, that opponent lost his life. She now ruled with her younger brother as husband and colleague. When Caesar returned to Rome, she and her boy-husband followed him to the Roman capital, and the latter was soon removed by administering poison.



BUST OF CLEOPATRA AT DEUDERAH.

At Rome Cleopatra lived openly with Caesar, but after his assassination returned to her native country. When civil strife for supremacy broke out in Rome, she took the part of Mark Antony, with whom she had formed a close acquaintance while he was campaigning in Egypt. She equipped a galley in gorgeous style and sailed up the Cydnus River to visit him, arrayed in all the magnificence of Eastern splendor. She so fascinated Antony with her beauty and personal charms that he was forever after infatuated with her. He followed her to Egypt and lived there for some time in great luxury and splendor. Afterward he left her and married Octavia, sister of Octavianus, but soon returned to Cleopatra, who assisted him in his military and naval campaigns in Syria and on the Euphrates.

The unpopularity of Cleopatra at Rome caused Octavianus Caesar to declare war against her personally. In 31 B. C. the famous sea fight at Actium decided the fate of both Antony and Cleopatra. She fled with her sixty ships soon after the battle opened and Antony hastened to follow her to Egypt. The two were pursued by Octavianus, whose design, however, was upon the life of Antony. Cleopatra failed to charm Octavianus as she had Julius Caesar and Antony, and, rather than be carried a prisoner

to Rome, she ended her life by allowing an asp to bite her arm, in the year 30 B. C. Previous to this Antony had been informed, falsely, that she had proved untrue to him, and he promptly committed suicide by falling upon his sword. Finding the report amiss, he was carried into her presence and died in her arms. She was the last of the Ptolemies of Egypt, and with her the dynasty ended. Her personal charms and literary tastes alike distinguished her, and she was praised for extensive intellectual ability. It is said that she was able to converse fluently in seven languages. Besides her son Caesarion, of whom Julius Caesar was father, she had three children by Antony.

CLEOPATRA'S NEEDLES, the name of two obelisks formerly at Alexandria, but one is now located in New York and the other is in London. They were erected by King Thothmes III., of Egypt, at the entrance of the great temple of Heliopolis, mentioned as On in the Scriptures, and near which Moses was born. After the death of Cleopatra, shortly before the Christian era, they were removed to Alexandria. The obelisk at New York was placed in Central Park in 1881. It was presented to America by the Khedive of Egypt.

CLEPSYDRA (klĕp-sĭ-drȧ), or **Water Clock,** an instrument devised by the ancient Greeks for measuring time. It consisted of one or more pipes with orifices at the bottom, and a scale of hours at the outside indicated the time in which the water flowed through the orifices. Another form consisted of a uniform flow of water through a pipe into a receptacle, which had a scale of hours to indicate the rise of the water.

CLERGY RESERVES, the allotments of land set apart for the support of the Protestant religion in Canada. It was provided by law that every seventh lot in the township of the two divisions known as Upper and Lower Canada be included in the reserves, and the government held that the benefits were to apply to the Church of England, though other Protestant churches received some of the grants. Roman Catholics regarded the reserves as unfavorable to their religion and the Baptists and Methodists generally opposed the policy of maintaining them. Opposition grew until 1854, when the church and state were formally separated by the laws of Canada, and the lands and moneys obtained from the sales of these reserves were divided equally among the townships according to the number of their inhabitants. Upper Canada had the largest number of reserves, a total of about 2,500,000 acres.

CLEVELAND (klēv'land), a city in Ohio, county seat of Cuyahoga County, on the southern shore of Lake Erie, at the mouth of the Cuyahoga River. It is the largest city of Ohio and the second largest port of the Great Lakes, being exceeded only by Chicago. Cleveland is 250 miles northeast of Cincinnati, 356 miles east of Chicago, and 525 miles northwest of Washington. It is the focus of many important trunk and branch railroad and numerous electric railway lines.

DESCRIPTION. The city has a lake frontage of ten miles, extends inland five miles, and has an area of thirty-five square miles. The site is more or less undulating, rises gradually from the lake front, and is about 115 feet above the surface of Lake Erie. It is divided into two unequal parts by the Cuyahoga River, known as Eastern and Western, and the portion lying west of the river is known as West Cleveland. Along the river is a low valley, in which are located many factories, coal yards, freight depots, ore docks, and other industrial establishments. Several great viaducts and many bridges cross the river, one of which, completed in 1878, is 3,210 feet long and cost $2,250,000.

The streets are wide, from 40 to 130 feet, and are beautified by elms and maples, hence Cleveland is known as the *Forest City.* Much of the paving is constructed of brick and asphalt, and in the business center a substantial grade of stone and cement blocks has been used in constructing the pavements. Superior Street, the principal business thoroughfare, is 132 feet wide and on either side has many substantial structures. Monumental Park, which is in fact the public square, is a tract of about ten acres, and from it the streets diverge in all directions. Euclid Avenue, the most beautiful street, begins at Monumental Park and extends east beyond Lake View Cemetery, whence it merges into Euclid Road. This avenue has a number of business houses at the western end, but is mainly a residence street and contains some of the finest homes and most tasteful lawns in the city. Just south of Euclid Avenue is Prospect Street, which is a noted residential thoroughfare. Case, Wilson, Jennings, Ingleside, and East Madison streets are noted for their fine lawns and beautiful homes.

PARKS AND CEMETERIES. Rockefeller Park, a tract of 800 acres, is situated in the eastern part of the city, and near it are Gordon Park and Wade Park. The latter has a zoölogical garden and a statue of Commodore Perry, which was formerly in Monumental Park. Lake View Park extends along the lake shore, and Brookside, Garfield, Riverside, and Shaker-Heights are worthy of mention. The chief drives, besides Euclid Avenue, include Ambler, Parkway, Ridge Road, Gordon Boulevard, and Grand Public Boulevard. Lake View Cemetery is in the eastern part of the city and contains the Garfield Memorial, which is 165 feet high and cost $130,000, and in the crypt beneath are the remains of President Garfield. Monumental Park contains the statue of Gen. Moses Cleaveland and the monument dedicated to the soldiers and sailors. Woodland and Riverside cemeteries are beautifully improved and contain many fine statues and monuments.



(Opp. 600) CLEOPATRA AWAITING NEWS FROM MARC ANTONY

BUILDINGS. The county courthouse, the city hall, and the post office and customhouse are the most prominent public buildings. Others of note include the Chamber of Commerce, the Union Depot, the Sheriff Street Market, the Arcade, the New England, the Lennox, the Ross, and the Colonial Arcade. Among the most prominent churches are the First Presbyterian, Plymouth Congregational, Saint Paul's Protestant Episcopal, and the Roman Catholic cathedral. The Euclid Avenue Baptist and the First Methodist churches are fine buildings and are centrally located. Among the principal hotels may be named the Colonial, Forest City, Hollenden, Weddell, Stillman, Kennard, and American. The places of amusement include the opera house, the Lyceum Theater, and the Academy of Music.

EDUCATION. The city maintains an adequate number of public schools, including all of the elementary departments, as well as a number of high and manual training schools. Many private and parochial institutions are within the city. Higher and professional education is provided for by the Western Reserve University, Baldwin University Law School, Saint Ignatius College, Case School of Applied Science, Cleveland College of Physicians and Surgeons, and Cleveland School of Pharmacy. The public library has 175,000 volumes, the Case library has 50,000 volumes, and other valuable collections are contained in many of the schools and colleges. All of the charities are well represented and many of the leading educational and scientific associations have a large membership.

INDUSTRIES. Cleveland has a large trade in coal and iron ore, being a distributing point for the coal of Ohio and the product of the iron mines of Michigan and Minnesota. It has a vast trade in grain and lumber and is the largest fresh-water fish market in America. As a manufacturing city it ranks second among the centers on the Great Lakes. The petroleum refineries, shipyards, machine shops, slaughterhouses, planing mills, paint works, and clothing factories are the chief enterprises. Transportation is facilitated by railroads that reach the principal commercial centers of the central parts of the United States and Canada. A breakwater protects the harbor, inclosing about 300 acres, and the Cuyahoga River has been improved by dredging so lake steamers have convenient wharfage on this stream as well as on the lake. The wholesale trade is an important feature of Cleveland, which supplies through its jobbing houses many points on the lake and inland.

HISTORY. The city is located in the Western Reserve, a tract of land formerly belonging to the State of Connecticut, and a part of this was purchased in 1795 by the Connecticut Land Company. Gen. Moses Cleaveland, from whom the city received its name, platted a village at the mouth of the Cuyahoga in 1796. It was organized as a town and made the county seat of Cuyahoga County in 1810, and five years later was incorporated. The Ohio Canal was opened between Cleveland and Akron in 1827, and from that time dates its prosperous growth. A number of adjacent villages and towns were united with it at different times, including Ohio City in 1853, East Cleveland in 1872, Newburg in 1873, and Brooklyn and West Cleveland in 1893. It has had a constant and steady growth and since 1900 it has had a larger population than Cincinnati. Population, 1910, 560,663.

CLEVELAND, Grover, statesman, born in Cadwell, N. J., March 18, 1837; died June 24, 1908. His father, Richard F. Cleveland, was a Presbyterian clergyman, who named his son after Rev. Stephen Grover, long a minister in the Presbyterian church at Cadwell. After the death of his father, he became a clerk and assistant teacher in the New York Institution for the Blind, and started west in 1855 in search of employment. He stopped at the home of his uncle, Lewis F. Allen, and aided in compiling a volume of the "American Herd Book" at a salary of ten dollars a week. He afterward studied law, was admitted to the bar in 1859, and acted as clerk at a salary of $600 a year, a portion of which he gave to his widowed mother, who died in 1882. In 1863 he became assistant district attorney of Erie County, and formed a law partnership with Isaac V. Vanderpool. In 1870 he was elected sheriff of Erie County, and three years later became a member of the firm of Bass, Cleveland & Bissell. His logic and mastery of language gave him high standing at the bar and brought him forward as a candidate for mayor of Buffalo, in 1881, to which office he was elected by a majority of 3,530 votes. He entered the office and soon became known as the "veto mayor," owing to his fearless and wise administration in guarding against illegal and extravagant expenditure of money, thus saving nearly $1,000,000 the first six months. In 1882 he was the Democratic candidate for Governor of New York and defeated his opponent, Charles J. Folger, with a plurality of 192,854 votes. His State administration was a continuance of his policy as mayor, according to which he carried out his announced policy, that is, "to make the matter a business engagement between the people of the State and myself, in which obligation on my side is to perform the duties assigned me with an eye single to the interest of my employers."



GROVER CLEVELAND.

The national Democratic convention at Chi-

cago in 1884 nominated him for President of the United States with a vote of 683 out of a total of 820. His Republican opponent was James G. Blaine. The canvass was remarkable for the discussion of the personal character and qualification of candidates. He received 219 votes and Mr. Blaine received 182 in the electoral college. He was nominated a second time, but was defeated by Benjamin Harrison, receiving 168 electoral votes and President Harrison receiving 233. The Democratic party nominated him a third time in 1892, and he was elected by a large majority. In the electoral college he had 277 votes, Harrison, 145, and James B. Weaver, the candidate of the People's party, 22. The most important events of his first administration are the removal of white intruders from Oklahoma by proclamation, and the expedition of a naval force to protect Americans during a revolution in Panama. Those of his second administration are the repeal of the silver act of 1890, calling for the purchase of $4,500,000 of silver bullion monthly, and the ordering of government troops to Chicago during a railroad strike to protect interstate commerce and the mail service, by which many lives and much property were saved. Another important event is the settlement of the Venezuelan boundary dispute between Great Britain and Venezuela, in which he appointed a commission of inquiry.

President Cleveland married Francis Folsom in the White House, June 2, 1886. This marriage was the first of a President in the White House. His second daughter, Esther, was the first child born in the executive mansion. Cleveland was the first of the presidents who served a second term without being elected as his own successor. His state papers and public addresses give him high standing among American statesmen, and his administration of public affairs was both wise and able. After retiring from the Presidency, he contributed to many magazines and delivered a series of lectures each year at Princeton University.

CLEVENGER, Shobal Vail, sculptor, born in Middleton, Ohio, Oct. 22, 1812; died Sept. 23, 1843. He was apprenticed to a stonecutter in Cincinnati, where he learned the art of a sculptor, and subsequently opened a studio in New York City. In 1840 he went to Rome to study art, and while there completed his noted production known as "The North American Indian." He died while returning to America. Among his best known portrait busts are those of Webster, Everett, Clay, and Van Buren. His portrait bust of Daniel Webster is considered an excellent likeness of that statesman and is used on a postage stamp of the United States.

CLICK BEETLE, the name of a family of bettles which are peculiar for their movements. Some of the species are known as skipjacks, elaters, and springing beetles. About 500 species are distributed more or less widely in North America and the family is well represented in all the continents. The *eyed elater* is a grayish-black beetle characterized by two large black spots on the thorax. The *wireworm* is a larva of the click beetle and lives at the roots of plants and under the bark of trees, frequently in rotten wood. It is so named from the sound it makes when it regains its feet by a spring, after being laid on its back on any hard substance.

CLIFF (klĭf), a slope or descent in the surface of the earth. Cliffs are formed by a dislocation of the earth's crust, or by the erosive action of water, or by volcanic disturbances. Waves carve the rocky coast cliffs by beating against the shore line, and their action is enhanced by the weathering of the rock that extends above the reach of the waves. The cliffs of canyons, gorges, and ravines are formed through the erosion of running water. Cliffs due to volcanic action are formed when the crust of the earth is fractured, a portion being elevated so as to form an abrupt cliff. Examples of this class are seen in many parts of the Rocky Mountains, where broken lava cliffs resulted from exposing the abrupt faces of fractures.

CLIFF-DWELLERS, a class of people long since extinct, though there are a number of races still dwelling in cliffs. The ancient cliff-dwellers inhabited portions of Mexico, Arizona, New Mexico, California, and Central America. Their dwellings were made in the rocky cliffs of mountains, and divers traces of them still remain. The valley of the San Juan River, in Utah and New Mexico, has many traces of these people, such as rude carvings and habitations in elevated cliffs. In many of them human skeletons, tools, utensils, and ornaments have been found. It is evident that they cultivated maize, cotton, and tobacco, and raised domestic animals. Some writers assume that they suffered by prolonged droughts and that they were finally extinguished by the Apache Indians. See **Pueblos.**

CLIFFORD (klĭf'fẽrd), **Nathan,** jurist, born in Rumney, N. H., Aug. 18, 1803; died July 25, 1881. He studied in the schools in Haverhill and Hampton, was admitted to the bar, and began the practice of law in York, Me., in 1827. He served in the State Legislature from 1830 to 1834, was attorney-general for four years, and in 1838 was elected to Congress as a Democrat. In 1846 he was made Attorney-General in the Cabinet of President Polk, and negotiated the terms of the peace treaty with Mexico. President Buchanan appointed him Associate Judge of the United States Supreme Court in 1858. He was a member of the electoral commission which decided the Hayes-Tilden controversy in 1877.

CLIMATE (klī'mât), the character of the atmosphere in regard to moisture and heat, together with meteorological conditions so far

as they exert an influence on vegetable and animal life. Climate is affected by latitude north and south of the Equator and by elevations above the sea. High latitudes have perpetual snow and ice, as around the North and South poles, while a similar effect is common to the elevations on the summit of mountain chains, as the Andes, Himalayas, and Alps. Isothermal lines indicate the condition of the climate, and, owing to modifying influences, are irregular when compared to the Equator, owing to variations in altitude. Besides these, there are many other modifying influences upon climate, such as the direction and position of the coast lines of continents and islands, the depth and position of the seas, and the source and direction of winds and oceanic currents.

The climate that exists on continents is called *excessive* or *severe* when it is marked by great differences between the temperature of the winter and summer, or by extremes in heat and cold that characterize the day and the night. The interior regions of Asia and North America are the best examples of excessive climates. A good illustration of *modified* climates is that of Great Britain, which is greatly influenced by the winds of the continent and the breezes and currents of the sea. The east wind passing over the frozen steppes of Russia, in the winter, renders its climate cold and dry, while a south wind coming over the continent of Europe, in summer, is hot and dry, and a wind from the southwest brings moisture and heat. Even the effects of spent cyclones from the surface of the Atlantic is manifest in the form of rain, heat, and storm. Similar remarkable effects may be noticed in the northwestern part of North America, where the warm currents of the Pacific Ocean greatly modify the climate of Alaska and the Aleutian Islands, and the warm Chinook winds modify the greater part of British Columbia, Washington, and Oregon. A similar effect is seen in Northern Africa, where the Atlas Mountains of Algeria shut out the rainfall from the northern part of the Siberian Desert. Similar and other effects are noticed in many localities of the earth on account of the prominent modifying conditions of climate.

It is certain that the climate has undergone many distinct and marked changes in the geological ages, evidences of which abound in the fossils of rocks, and in the various formations in the different ages or periods. For instance, during the carboniferous age both animal and vegetable life seems to have been quite uniform from the Equator to the Arctic zone, hence there must have been only a moderate difference in temperature in the various latitudes, and the summer and winter seasons appear to have been very much alike. Some geologists think that the poles were once centers of great heat, which have been modified from time to time until the present state of excessive cold was reached, with conditions more favorable to animal and vegetable growth at the Equator. Others think that the slight alterations in the earth's orbit tend to produce changes in one direction for a long period of time, and then in the other for an equal period. The effects of these changes, which are quite clearly shown in geological formations, are well known.

CLINGMAN (klĭng'man), **Thomas Lenier,** public man, born in Huntville, N. C., July 27, 1812; died in 1897. He studied at the University of North Carolina, where he graduated in 1832, and in 1840 was elected a member of the State Legislature. In 1843 he was sent to Congress as a Whig. He was appointed to fill a vacancy in the Senate in 1858 and subsequently was elected to a full term, but resigned in 1861 to enter the Confederate army. He participated in the battles of Goldsboro, Drury's Bluff, Cold Harbor and Petersburg.

CLINTON, county seat of Dewitt County, Illinois, 22 miles south of Bloomington, on the Illinois Central Railroad. It has high school, county court house, and public waterworks. The industries include machine shops and grain elevators. Population, 1910, 5,165.

CLINTON (klĭn'tŭn), a city in Iowa, county seat of Clinton County, on the Mississippi River, 136 miles west of Chicago. It is on the Chicago and Northwestern, the Chicago, Milwaukee and Saint Paul, the Chicago, Burlington and Quincy, and other railroads. The chief buildings include the Wartburg College (Lutheran), the city hall, the county courthouse, and the public library. It is noted as a distributing point of timber rafted down the river, which is prepared for the market in vast saw and planing mills. Other industries include flouring mills, canning works, iron foundries, furniture works, and machine shops. Three immense iron bridges, about four thousand feet long, cross the river. Electric street railway lines connect all parts of the city. It has gas and electric lighting, pavements, waterworks, sewerage, and many fine residences. Lyons, located a short distance north of the main part of the city, was annexed to Clinton in 1895. Population, 1905, 22,756; 1910, 25,577.

CLINTON, a town in Worcester County, Massachusetts, 44 miles west of Boston, on the Boston and Maine and the New York, New Haven and Hartford railroads. It has a public library of 26,500 volumes, a central high school, and a fine public park. Among the manufactures are carpets, ginghams, plaids, clothing, machinery, and utensils. The public utilities include waterworks, gas and electric lighting, and street pavements. A system of electric railways connect it with other trade centers. It has been an incorporated town since 1850. Population, 1905, 13,105; in 1910, 12,075.

CLINTON, county seat of Henry County, Missouri, 88 miles southeast of Kansas City. It is on the Saint Louis and San Francisco, the Missouri, Kansas and Texas, and other

railroads. The chief buildings include the high school and Baird College. It has manufactures of earthenware, flour, pottery, and machinery. Large quantities of grain, coal, and live stock are exported. It was settled in 1835 and incorporated in 1840. Population, 1910, 4,992.

CLINTON, a city in Vermilion County, Indiana, 18 miles north of Terre Haute, on the Wabash River and on the Chicago and Eastern Illinois Railroad. It has a high school, public library, and interurban railways. The industries consist of mining and manufacturing. It was settled in 1824 and incorporated in 1881. Population, 1910, 6,229.

CLINTON, De Witt, statesman, born at Little Britain, N. Y., March 2, 1769; died Feb. 11, 1828. He was the son of Gen. James Clinton and a nephew of George Clinton. His education was secured at Columbia College, and later he studied law and acted as secretary to his uncle. He was chosen to the Legislature of New York as a Republican in 1797, and became a leader of his party in the State. In 1802 he was elected to the United States Senate, but left that body to become mayor of New York City, which position he held for eleven years. Later he became State Senator, Lieutenant Governor, and then Governor. In 1812 he was the candidate of the Federalists and the New York Democrats for President and received twenty-nine electoral votes. He was an important factor in effecting internal improvements in the State of New York and urged the construction of the Erie Canal against opposition.

CLINTON, George, statesman and soldier, born in Ulster County, New York, July 26, 1739; died in Washington, D. C., April 20, 1812. He was trained for the military service by practical instruction while on a privateering cruise, and served as lieutenant in the expedition against Fort Frontenac, Canada. Later he was admitted to the bar. After serving as a member of the New York Assembly, he was elected to the Continental Congress and to the Constitutional Convention of New York in 1777. In the same year he became brigadier general in the Continental army, making a brave defense of forts Montgomery and Clinton on the Hudson River, but was taken prisoner by the British. He was the first Governor of New York, and was reëlected six times in succession. In politics he was allied with the Whigs. To his vigorous efforts were due the protection of New York against hostile Indians. He was the first to suggest the Erie Canal. He was chosen vice president of the United States in 1804, Jefferson being President. Four years later he was reëlected with Madison as President, and aided in defeating the continuance of the United States bank in 1811.

CLINTON, Sir Henry, British general, born in 1738; died Dec. 23, 1795. He was the only son of George Clinton, who was Colonial Governor of New York from 1741 to 1751. His first active service was in 1760, in the Seven Years' War, in which he won much distinction in the Hanoverian campaigns. He was sent to America in 1775 to take part in the Revolutionary War. He commanded the final charge at the Battle of Bunker Hill and gained a victory for the British, and later captured forts Clinton and Montgomery on the Hudson. In 1778 he succeeded Lord Howe as chief commander of the British forces in America, and was a leading factor in all the important movements preceding the surrender of Cornwallis in 1781, after which disaster he returned to England. He served as a member of Parliament in 1782-84. Shortly after he became Governor of Limerick and in 1793 was made Governor of Gibraltar, at which post he died. An ill feeling existed between him and Lord Cornwallis, his second in command, who desired to supersede him and charged him with inefficient service. In reply, Sir Henry published "Narrative of the Campaign in America," "Observations on Lord Cornwallis," and "Observations on the History of the American War." He was superseded in America in 1781 by Sir Guy Carleton.

CLINTON, James, general, born in Ulster County, New York, Aug. 9, 1736; died in Orange County, New York, Dec. 22, 1812. He served as captain during the War of 1756 between the English and French, rendered valuable service at the capture of Fort Frontenac, and was appointed captain commandant of four regiments to protect the frontiers of New York. He commanded in the Revolution against the British, and distinguished himself against the Indians in 1779. Later he became a member of the New York Legislature. He served as a member of the convention that adopted the Constitution of the United States, and was one of the commissioners to adjust the boundary line between New York and Pennsylvania.

CLIO (klī'ō), in Greek mythology, one of the nine Muses, daughter of Jupiter and Mnemosyne. She presided over history and epics and is represented with a laurel crown on her head, a trumpet in her right hand, and a book or roll of papyrus in her left. Mention was first made of her by Hesiodus.

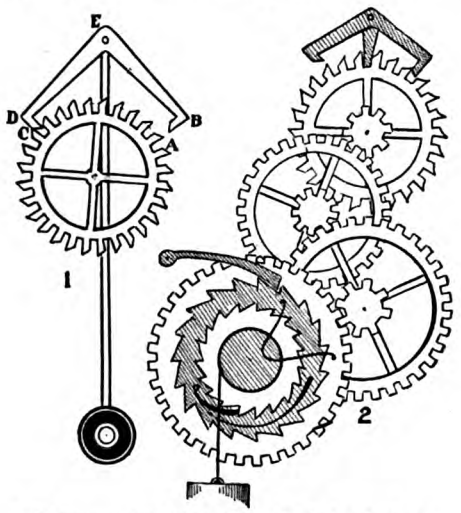
CLIVE (klīv), **Robert, Lord,** founder of British supremacy in India, born at Styche, England, Sept. 29, 1725; suicided Nov. 22, 1774. He showed aptitude for learning at an early age, and was of a fearless and combative disposition. In 1744 he became a clerk in the service of India at Madras, but owing to ill health abandoned the position and entered the military service. In August, 1751, he made an attack on the city of Arcot with 200 English troops and 300 Sepoys, and after a siege captured the city, thus laying the foundation for English supremacy in India. Owing to his efficient service he was called "The Daring in War" by the natives. He returned to England in 1753 and two years

later, after a recovery of health, returned to India with the rank of lieutenant colonel. He was made Governor of Calcutta, where he avenged the Black Hole massacre and attained success against the encroachments of the Dutch. In 1760 he again returned to England and the next year was raised to the Irish peerage for his service to the government, with the title of Lord Clive, and later became Baron of Plassey. He returned to India shortly after, affairs having fallen into general confusion there, but in eighteen months he restored order and discipline, both in military and civil affairs, causing a return of prosperity to the depressed finances of the East India Company. In 1767 he again returned to England, where he was received with distinction and enthusiasm. A feeling sprang up in England that he had gathered an undue amount of wealth in Bengal, and his conduct was examined by a committee of Parliament, but he was acquitted. The form of acquittal did not satisfy him and led to his suicide in a fit of melancholy by administering opium.

CLOCK, an instrument for indicating and measuring time. The name is probably derived from the German word *Glocke,* meaning bell. Time is indicated by means of hands in hours and minutes, and in some instruments by similarly noting seconds, days, and months. In ancient times clocks similar to those now in common use were unknown. Time was measured by means of the shadow cast on an instrument by the sun, called a *sundial.* These could not show the time on a cloudy day. In some countries dials were used to indicate the time at night, called *moon dials.* Later time was indicated by means of water glasses. These instruments consisted of vessels filled with water, with small openings at the bottom through which the water passed drop by drop into a vessel beneath. On the sides of the vessels were spaces indicated by lines, and the time was marked by the height of the water. This form was not satisfactory, since water does not pass uniformly through an opening, and led to the invention of the *hourglass,* similar to those now used. An hourglass is shaped like a figure eight, the upper side being filled with fine sand, which passes through an opening into the lower part in a definite time. When the sand has all passed to the lower apartment, the instrument is reversed and measures time by the sand passing to the apartment formerly at the top. King Alfred the Great measured time by a gradual burning of candles on which colored rings were placed to indicate the period requisite for the flame to consume the material in the candle.

It is not known when clocks were first invented, but they are of great antiquity. Plato invented an instrument in the year 372 B. C., which indicated the hours of night upon organ pipes. Archimedes made a clockwork filled with springs and weights in about the year 200 B. C., and likewise adopted the apparatus to move toys and mechanical engines. The invention of a mechanism for regulating the speed of the going works, on a plan whereby to join wheels to a pointer which traverses the dial, is of newer date. It is not known when these mechanical features of a clock were completed, but they are thought to date from about the beginning of the 11th century A. D.

Clocks are mainly of two kinds. The style in common use is the one in which the wheels are moved by power from the uncoiling of a spring and the other kind is moved by a gradual falling of a weight, both the uncoiling of the spring and the falling of the weight being regulated by the swinging of a pendulum. The power is applied to a train of cogwheels. In eight-day clocks the train of wheels consists usually of four cogwheels. The power tends to move the wheels quickly and run down the clock with an even motion, but an escapement, fastened to the pendulum, is connected with the train of wheels. Its effect is to change the even motion into little leaps or jerks, thus governing the entire movement. The escapement is adjusted so as to articulate with the escapement wheel, the last of the train, and which usually has thirty teeth or



1, Escapement and Pendulum; 2, Train of wheels moved by a weight.

cogs. This is shown in the illustration. As the pendulum, which is attached on the pinion E, swings to and fro, the two pallets B and D strike alternately against the cogs on the opposite sides of the escapement or balance wheel, as shown at A and C, and thus regulate the movement. Each full swing of the pendulum in an ordinary clock marks two seconds of time, and each two revolutions of the escapement wheel, one minute. The cogs of the different wheels are so arranged that the wheel to which the second hand is attached moves around once in a minute; the minute hand, once in an hour; and the hour hand, once in twelve hours. In cases

where days, weeks, and longer periods are indicated similar mechanisms are used. At the beginning of the 13th century clocks were placed in church towers, and are now frequently seen in public buildings and churches.

Among the most remarkable clocks are those in great churches. These usually require large pieces of mechanism to overcome friction. The clock in the tower of Trinity Church, New York, is wound by a crank which is turned about 800 times in winding the clock. In Strasburg, Germany, the clock in the cathedral is one of the most noted ever made. It shows the motion of the planets and the sun, and marks the minutes, hours, days, months, years, and the important festivals of the year. It contains many figures moved by machinery. The statues of four old men are located in the upper part and strike the quarter hours. At every quarter hour death comes forward, but Christ meets him with a spear and drives him back. At the last quarter Christ passes inside, while death comes out and strikes the hour with a bone in his hand, which is followed by beautiful chimes.

American inventions have revolutionized the manufacture of clocks. Those produced largely by the Waterbury Clock Company and other similar manufacturers more nearly resemble watches than clocks, and they have been exported to every country in the world. Electrical clocks were manufactured as early as 1840, but they have been greatly modified and improved in recent years. In these clocks one accurate clock is connected by wires with others, which are controlled and kept in exact time by the first. The principal clock has a pendulum that makes and breaks a circuit at stated intervals; and all the other clocks in the series beat the same time. They are used extensively in offices and public buildings. In another form of electrical clocks a master clock is attached to a number of clock faces by means of electrical currents. At the expiration of each minute an electrical impulse passes from the master clock to the different clocks in the circuit, and the hands of the clocks controlled advance one stroke each minute.

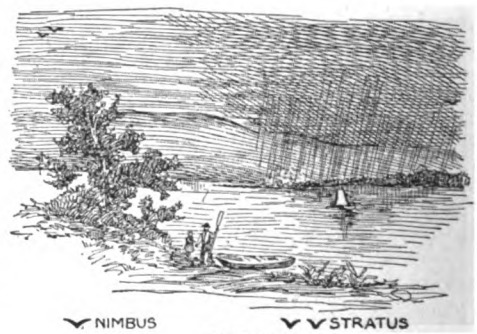
CLOISTER (klois'tĕr), a covered passage or gallery running through the walls of certain buildings, especially those used for colleges and monasteries before the Reformation. In most of the buildings of this kind one of the walls was formed by the architectural structure to which it was attached, while an open arcade or a series of windows formed the other side. The roof, which was usually vaulted, was supported by pillars and arches. Cloisters were used by the inmates of the monasteries for exercise and recreation, and many of them had an open space which contained a well and gardens. The German word *Kloster* has reference to the whole establishment, including the chapter house and the dormitories as well as the church. Many churches of Italy, Germany, England, and France retain the galleries or arched ways to which the term *cloister* is applied in a strict sense.

CLOQUET (klō-kwĕt'), a city of Minnesota, in Carleton County, 20 miles southwest of Duluth. It is situated on the Saint Louis River and on the Northern Pacific and the Great Northern railroads, and is noted for its extensive sawmills and lumber yards. The manufactures include machinery and lumber products, such as shingles, furniture, and wood pulp. It has a number of excellent schools, waterworks, electric lights, and a growing trade in manufactures and merchandise. Population, 1910, 7,031.

CLOTH. See **Weaving.**

CLOTHES MOTH, the name applied to several species of moths, the larvae of which are harmful to furs, woolen, cloths, feathers, and stuffed animals. Exposure to light and the application of turpentine are good preventives.

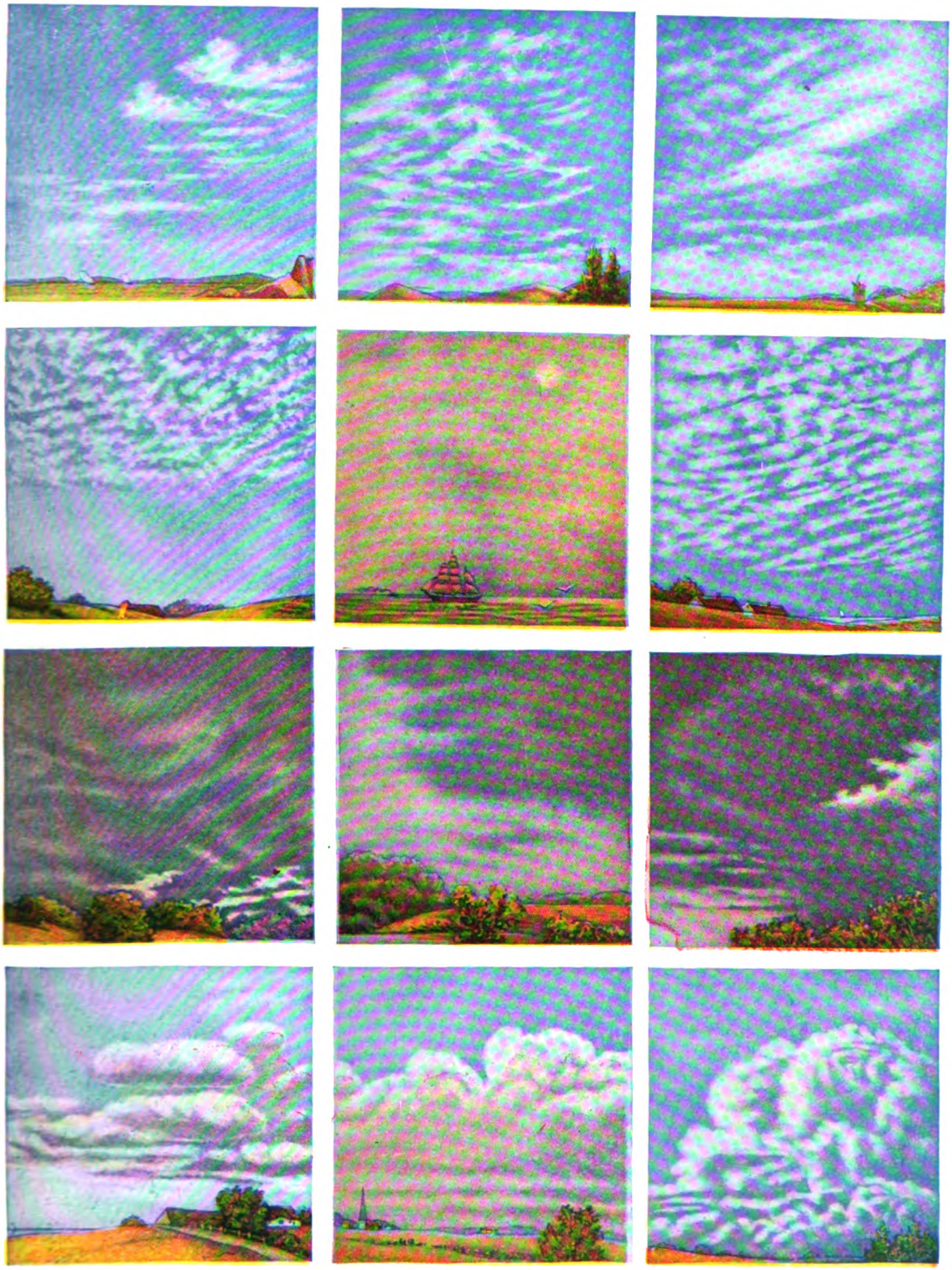
CLOUD, a mass of vapor condensed into minute drops, differing from fogs chiefly in that the drops float in higher regions of the atmosphere. Clouds and fogs are derived from vapors that rise from the moist earth, from fresh water, or from the sea. The minute drops of water



CLOUDS.

that constitute clouds and fogs are formed of a substance about 800 times heavier than air, and are prevented from settling rapidly by the resistance of air. The minute size of drops renders this possible. Whenever they exceed a certain size, they fall as rain or snow. The warmer air usually carries the greater amount of moisture, and, when coming in contact with colder air, the clouds or fogs result. On the contrary, clouds and fogs disappear on the approach of a warm, dry wind.

Clouds are generally higher during the day than during the night, and are higher in the tropics than in the polar regions. The mean height in winter is from 1,300 to 1,500 yards, and in summer from 3,400 to 4,400. They often exist at a distance of 250 yards above the ground, and as high as 7,500 yards, while the *cirri,* light forms of clouds, attain a much greater elevation. Although clouds generally appear stationary, they are really descending slowly, but their lower parts are dissipated by air more highly heated and their upper portions



(Opp. 606)

CLOUDS.

1. Cirrus.
2. Cirrus.
3. Cirro-Stratus.
4. Cirro-Cumulus.
5. Alto-Stratus.
6. Alto-Cumulus.
7. Strato-Cumulus.
8. Nimbus.
9. Nimbus.
10. Cumulus.
11. Cumulus.
12. Cumulus-Nimbus.

become increased by fresh condensations. For this reason their descent is disguised, giving them a stationary appearance. All are more or less charged with electricity, some positively and others negatively, but their tension is greatest during a thunder storm. Clouds carry the moisture needed by plants from the sea, and distribute it over the vast interior of islands and continents, where it falls in the form of rain, snow, or hail.

Clouds are classified in four primary forms: the *cirrus,* the *cumulus,* the *stratus,* and the *nimbus.* Cirrus clouds consist of feathery masses of condensed vapor that are suspended in the higher regions of the atmosphere. They were so named from their resemblance to a lock of hair with fiber diverging in all directions. Owing to their elevation, the moisture is thought to consist of ice particles. The halos or circular bands of light around the sun are caused by light passing through cirrus clouds. Cumulus clouds are denser than the cirrus, and are formed in the lower regions of the air, where the quantity of vapor is greatest. They consist of irregular heaps and rounded masses with moderately broad bases. They originate from ascending currents of air which have their moisture condensed by the cold produced by expansion and elevation. They are seen more frequently during the hotter part of the day at a height seldom exceeding two miles.

The stratus clouds consist of long, horizontal sheets or bands. They are seen more generally in the morning and evening, when the ascending currents are weak, and are caused by gradual settling of the cumulus and other clouds. The stratus clouds are the lowest, often falling to the surface of the earth and becoming a fog. The nimbus are the storm clouds from which rain falls. They may be formed by any of the various clouds coming together or collecting. The nimbus clouds are usually seen as a dense cloud spreading out into a cloud of cirrus with a shower passing beneath. They are the least attractive among the clouds, but are the only ones attended by the splendid phenomenon of the rainbow, seen only when drops of water fall to the earth in the form of rain. Besides these several classes of clouds, there are several secondary forms, known as the *cirro-stratus,* the *cirro-cumulus,* and the *cumulo-stratus.* These are modifications of the other forms.

CLOUDBERRY, a plant of the same genus as the dewberry, distributed more or less widely in America and Europe. It grows to a height of eight or ten inches, has few leaves, bears large white flowers, and produces an orange-red fruit with an agreeable flavor and about the size of a dewberry. It is confined chiefly to the moors of Great Britain and the central part of Europe, but is very abundant in Sweden and Norway, where it is highly valued in making preserves.

CLOUD-BURST, the name applied to a very heavy local rain, chiefly when the rainfall exceeds the rate of ten inches per hour and not less than six inches fall during the unusually heavy precipitation. Cloud-bursts occur at rare intervals on the eastern slope of the Appalachian Mountains, especially in the region lying between Georgia and New York, where heavy floods follow excessive rains of a local character. They occur more or less frequently on the coast of Washington and British Coumbia, in the valley of the Amazon, and on the southwestern coast of Chile. It must be noted that there is a difference between a heavy rain and a cloud-burst, since the former covers a reasonably large area while the latter is confined to a small area, usually a few acres, and is thought to be due to thunderstorms or to the fact that rapidly ascending currents hold a mass of water within the cloud for a brief time, after which it falls suddenly to the earth. Cloud-bursts on the eastern slope of the Rocky Mountains are accompanied by heavy thunderstorms and fill the dry channels with large quantities of water, causing destructive mountain torrents to sweep across the valleys below.

CLOVER (klō'vēr), or **Trefoil,** the name of various plants of the pea family and of the genus *Trefolium.* There are no less than 150 species, some of which are weeds, but many are valuable food of animals and serve a useful purpose in increasing the fertility of soil. The red clover is a biennial, consisting of several kinds. It is sown with oats, barley, or other grain in the fall or spring, and bears a full crop the succeeding year. The Dutch clover bears a white flower, is a perennial, and is sown with various grasses when intended as permanent pasture for sheep. The French clover ripens early, is an annual, and is useful in pasturage. Timothy, rye grass, and other species of grasses are sown with clover, being then cut for hay. Several species are useful in bee culture, their flowers being rich in food for the production of honey. Many of the poorer and exhausted lands may be redeemed and fertilized by clover sown with grains and plowed



RED CLOVER.

under when six to ten inches high. Alsike or Swedish clover has long been cultivated in the southern part of Sweden. It is recommended for cold climates and as suitable for cultivation in moist and heavy soil. It is similar in growth and structure to the red clover, and is cultivated extensively in North America and Europe. The red clover is the best for hay, while the white clover, when mixed with grasses, serves the best purpose for pasturage. Caterpillars and burrowing quadrupeds are common enemies to clover. They destroy it either by eating the foliage or by damaging its roots.

CLOVES (klōvz), the unexpanded dried flowers of the clove tree, used as a pungent aromatic spice. The tree is of the myrtle family and attains a height of from fifteen to thirty-five feet, being an evergreen with leaves from three to five inches long. Its flowers are of a purple color. The value of cloves is due to the oil of cloves, which constitutes about one-sixth of the whole weight. It has an acrid taste and a characteristic odor. It is used as a medicine, especially as a stomachic and to stimulate the appetite, and in cookery is prized for flavoring dessert dishes. The tree was first discovered by the Dutch in the Moluccas, but is now cultivated in India, Zanzibar, Ceylon, and the West Indies

CLOVIS (klō'vĭs), King of the Franks, born in 465 A. D.; died at Paris, France, in 511. He was the grandson of Merovig, from whom the Merovingian kings take their name. In 481 he succeeded his father, Childeric, whose capital was at Tournay. Five years later he conquered the Gallo-Romans, and gained dominion over the entire country between the Somme and the Loire. He married Clotilda of Burgundy in 493, and under her influence became a Christian. His power and fortune increased from this time, and through him France became a Christian nation. He was noted for his character of energy, fierceness, and cruelty in war. After his death the kingdom was divided among his four sons, Clothaire, Clodomir, Childeric, and Theodoric.

CLUB, an association of persons combined for the promotion of a common object, whether social, political, or otherwise. The name probably comes from knot, meaning a knot or gathering of persons. The earliest club of London was organized in the beginning of the 17th century, at Mermaid Tavern, on Friday Street. It numbered among its distinguished members William Shakespeare, Sir Walter Raleigh, Fletcher, Beaumont, and Sheldon. Ben Jonson was a prominent figure at the club that met near Temple Bar. The Literary Club, established in 1760, numbered among its members Burke, Goldsmith, Boswell, and Johnson. Clubs and kindred associations are maintained at present in all the countries, especially in those of Europe and America, and the larger organizations are centered in the cities.

The club life of America has been greatly enlarged within the past twenty years. Every large city has one or more important buildings erected especially as the quarters of some prominent club, such as the Illinois Club of Chicago, the Metropolitan Club of New York, and the Hunt Club, Cote des Neiges, of Montreal Clubs of this class usually have reading rooms, apartments for bathing and playing various games, and rooms designed for meetings of a business nature. Many men's clubs admit women as visitors, but a large number of clubs are maintained distinctly for women.

Women's clubs are numerous in all the cities of Canada and the United States, and interest themselves in religious, professional, temperance, suffrage, social, educational, and other lines of study. In some of the larger cities these clubs maintain reading rooms and excellent libraries. It has been observed that the clubs of both men and women serve a useful purpose in modern civilization. They are aiding materially in philanthropic and educational lines, and thereby tending toward a betterment of humanity.

CLUNY (klü-nē), or **Clugny**, a town of France, in the department of Saône-et-Loire, twelve miles northwest of Maçon. It is situated on the Grône River, in a valley between two mountains, and has extensive manufactures of pottery. Cluny is noted chiefly for its history in connection with a number of monasteries. It was a small village until 910, when an order of the Benedictine monks was founded here, and it had fully 2,000 monastic communities prior to the French Revolution. They were known as the Monks of Cluny, or the Congregation of Cluniac Monks, and had establishments in France, Spain, England, Italy, and other countries of Europe. The Abbey church at Cluny, one of the finest monuments of the Middle Ages, was destroyed in 1789.

CLYDE (klīd), a river of Scotland, flowing westward a distance of 106 miles. A number of important cities are on its banks, including Glasgow, Bothwell, and Lanark. Near Lanark are four famous falls. The river has been deepened and made available for steamboats; the first large steamboat launched in Europe was on the Clyde in 1812. Near the mouth it widens into the Firth of Clyde. The basin drained by it contains rich mineral deposits and fertile soil, and the manufacturing centers upon its banks are among the most important in Scotland.

CLYTEMNESTRA (klī-tĕm-nĕs'trȧ), a personage mentioned by Homer as the daughter of King Tyndareus and Leda and the half-sister of Helen. She became the wife of Agamemnon and during his absence at the siege of Troy bestowed favors upon Aegisthus. She murdered her husband on his return, and, together with her paramour, ruled Mycenae for seven years. Both she and her lover were killed by her own son, Orestes.

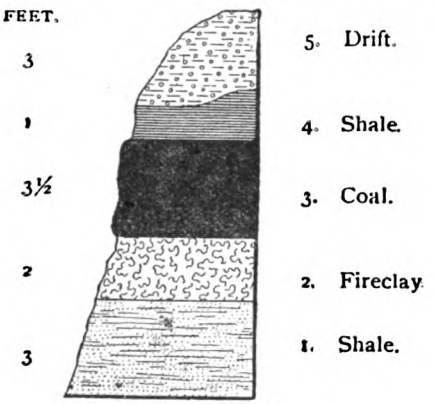
COACH, a four-wheeled closed carriage for private or public conveyance. In ancient Rome they were constructed in the form of both covered and uncovered carriages and constituted the chief means of conveying passengers. At present these vehicles are built largely for four passengers in the inside, and in some countries contain arrangements for ten or twelve on the outside. In the early history of America, especially before the Revolution, regular lines of coaches and stages were maintained to convey passengers and goods between the largest cities. Transportation of this kind is still available in the sparsely settled regions of the western part of the United States and the northern and western sections of Canada. However, coach conveyance has been largely superseded by railways, automobiles, and street cars. See **Carriage.**

COAL, a carbonaceous mineral of a black, shiny, or dull color, and used extensively for fuel. It is composed of about seventy-five per cent. of carbon and contains hydrogen, oxygen, a small per cent. of nitrogen, and small quantities of earthy impurities. It is formed of compressed and chemically changed vegetable matter derived from luxuriant growths during former geological ages. The stems, leaves, and spores of jungle growths accumulated, and hydrogen and oxygen were evolved with some of the carbon. The volume was reduced so as to form about one-ninth to one-eighteenth of its original bulk, the relative proportion of carbon was increased in the mass, and eventually the whole was solidified into a decomposed vegetable pulp very much like peat. The constituents in every hundred parts of dry vegetable matter were about forty-nine per cent. of carbon, six per cent. of hydrogen, and forty-five per cent. of oxygen. In decomposition, which occurred under water, it retained most of the carbon, together with parts of the hydrogen and oxygen.

The different kinds of mineral coal are divided by Dana into *anthracite, bituminous coal, cannel coal, lignite coal, earthy brown coal,* and *mineral charcoal.* Anthracite, bituminous, lignite, and cannel coal are the kinds marketed most extensively. Anthracite coal contains about ninety per cent. of carbon, burns with little flame, and is much used in kilns, furnaces, and by blacksmiths. Bituminous coal has more or less bituminous matter and is commonly used for fuel in heating and in engines. Cannel coal has an earthy appearance, burns with a bright flame, and is used extensively in gas making. The lignite or brown coal contains only about fifty per cent. of carbon and is not used extensively for manufacturing purposes. However, it is a valuable fuel in sections where other grades of coal are not found, as in North Dakota and some sections of Saskatchewan, and burns easily when an extra draft of air is admitted to the stove.

In many of the coal fields there are from one to four veins, with a thickness of from two to fifty feet. It is not often that all the veins are workable, nor are all of them of equal value. Many deposits consist of drifts, or pockets, and others are in great veins and underlie large tracts of country. The formations common to the coal fields, including both the coal and the intervening rocks, are known as the *coal measures.* The methods of mining differ with the thickness of the veins, the class of coal, and the character of the roof, or rocky formation covering the deposits. In many localities the vein crops out at the hillsides and the coal may be easily secured, while in others shafts are sunk several hundred feet and the coal is hoisted by means of steam or electric power. The output of bituminous coal greatly exceeds all others, but the anthracite is the most valuable and is regarded the best for many purposes.

Coal was not known to the early ancients. It appears to have been used in 852 A. D. in

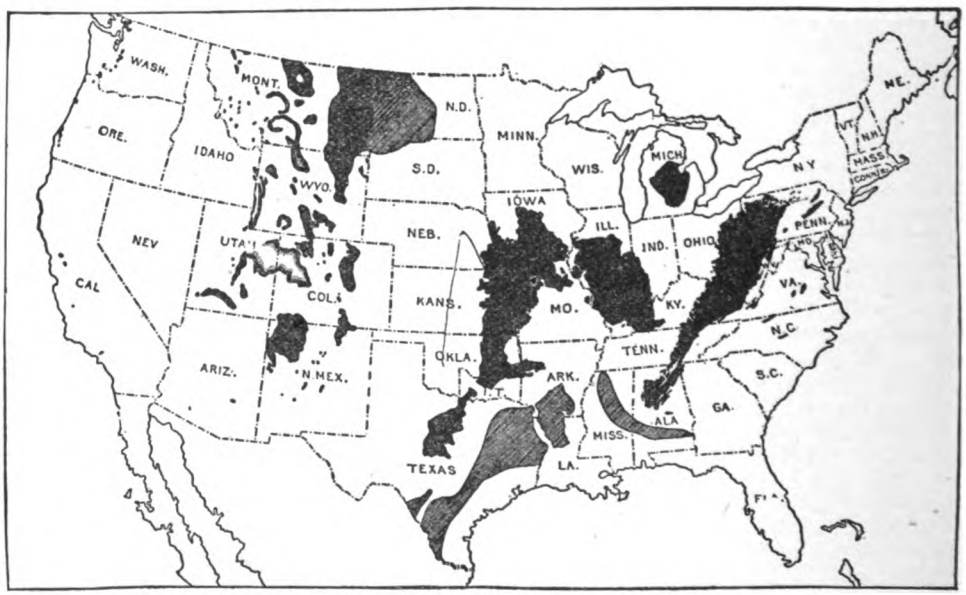


COAL STRATUM.

England, but was not known to the Britons before the Roman invasion. For a long time it was thought to be injurious to health, and a common prejudice prevented its entering largely into a fuel material in the avenues of manufacture and household economy. It is now used extensively by all civilized people, and is found widely distributed in all the continents. The United States, Great Britain, Germany, Austria-Hungary, and Russia are among the greatest coal-producing countries in the world. Coal deposits are found in thirty-five of the states and territories of the Union, and the products in twenty-nine have reached commercial quantities. Pennsylvania, West Virginia, Illinois, Ohio, Alabama, Indiana, and Colorado, are the leading coal-producing states. The annual production of the United States aggregates about 560,500,000 tons, valued at about $690,500,000. Besides, the deposits of the colonial possessions, particularly those of the Philippine Islands, are known to be of great extent. Canada has ex-

tensive deposits of coal and has an annual output of about 15,000,000 tons. The deposits are chiefly in British Columbia, Nova Scotia, New Brunswick, and Alberta.

COAL TAR, or **Gas Tar,** a product obtained in the manufacture of illuminating gas from tar. It is a dark-colored, opaque liquid, is somewhat heavier than water, and has a disagreeable odor. Coal tar is made up of many compounds, including anthracene, benzine, creosote, ammonia, xylene, naphtha, and carbolic acid. It is used in making several kinds of dyes and aniline colors and in the manufacture of alizarin and salicylic acid. Coal tar formerly was considered a waste material, but it now constitutes the source of many substances valuable in science and the industries. It is used as it comes from the factory as a substitute for paint in coating shingled roofs and to protect wood from rotting, especially such as posts and the portions of telegraph poles put in the ground.



COAL AREAS OF THE UNITED STATES.

(The black are bituminous and anthracite and the shaded are lignite.)

COASTAL PLAIN (kōst'al), the name generally applied to the lowlands bordering on the sea. The most noted region of this character in North America stretches from New York Bay, along the Atlantic Ocean, to the Gulf of Mexico, in Florida, whence it extends along the northern and western coasts of that body of water to the state of Vera Cruz in Mexico. It varies in width from 20 to 200 miles, but extends inland considerably farther along the streams, especially in the Mississippi Valley, where it penetrates north to the mouth of the Ohio River. A rise known as the Fall Line marks the eastern boundary of the Atlantic coastal plain, due to the upheaval of rocks near the foothills of mountains, and in many places the streams pass over precipices and form cataracts, such as those in the James River at Richmond, Va., and in the Potomac at Washington, D. C., below which cities these streams are navigable. The formations of the coastal plain include those deposited during the Pleistocene, Neocene, Eocene, and Cretaceous periods, and retain their position quite like that acquired during deposition, but are more elevated than originally on account of being uplifted above the ocean.

COASTING, an outdoor pastime originated in Russia, and next to skating one of the most popular winter sports in the colder parts of the temperate regions. It consists of sliding by means of a sled down an inclined grade or bank covered with snow or ice. The sleds are made in a variety of forms, frequently of a framework of iron or of solid board. In the former the runner is wholly of iron and extends forward and upward in a curve, while wooden runners are usually shod with steel. Coasters may either sit or kneel in making the trip, or may lie so as to steer with one leg. Coasting may take place on a hillside or on an artificial embankment or grade, though places used for public traffic cannot be used for this purpose. See **Toboggan.**

COAST RANGE, a range of mountains in California, extending from the northern to the southern part of the State, and trending parallel to the coast. At the southern extremity are San Bernardino Mountain, 11,580 feet above the sea, and San Jacinto Mountain, 10,987. The

range is about forty miles wide, is rich in minerals, and contains some beautiful and fertile valleys, among them the Santa Clara, Los Angeles, and Sonoma valleys. An extension of this range penetrates northward through Oregon, Washington, and British Columbia, where it merges into the Cascades on the east and the Island Range on the west. Most of the mountains belonging to the Coast Range are steep and rocky, but the region has fine forests and several passes penetrate the system.

COAST SURVEY, a survey of the coast of the United States, first recommended by President Jefferson in 1807. By an act of Congress the President was authorized to cause the coast to be accurately surveyed and a chart of each part to be prepared for future reference. The work was not commenced until 1817, when E. R. Hassler, a German of Switzerland, was secured to begin the surveying and mapping. Owing to a want of suitable appropriations, the work was not prosecuted with much success until 1832, when Professor Hassler was authorized to employ astronomers to carry forward the enterprise with vigor. He remained in the work until his death, in 1843, when he was superseded by A. D. Bache, who continued to superintend operations until his death in 1867.

Since 1867 the coast and geodetic survey has been promoted without intermission under competent superintendence. It is now a bureau under the Department of Commerce and Labor. The coast lines of the United States, exclusive of Alaska, reach a total of 7,050 miles, and, including the numerous indentations of bays and gulfs, aggregate a total length of 29,350 miles. The coast survey has for its object to determine the position of various points along the coast by accurate methods, to secure a definite knowledge of the coast line and features of the land, to survey the channels and shoals near the shore, and to note the effects of currents, tides, and winds upon navigation and the bottom of the sea. The work is one of vast importance to navigation and commerce, and by means of it many advantages have been obtained for the American shipping enterprises. Besides saving many lives, it has been the means of shortening routes, avoiding dangers, and making travel by water much more efficient and profitable.

COATESVILLE (kōts'vĭl), a borough of Pennsylvania, in Chester County, forty miles west of Philadelphia, on the Pennsylvania and the Philadelphia and Reading railroads. It is located on Brandywine Creek, is surrounded by a fertile country, and has a large trade in produce and merchandise. The manufactures include silk and woolen goods, ironware, boilers, and hardware. The waterworks are owned and operated by the municipality. Coatesville was settled about 1800 and has been incorporated since 1867. Population, 1910, 11,084.

COATI (kō-ä'tē), or **Coati-Mondi,** a genus of carnivorous animals native to the tropical regions of South America and Mexico. The *Mexican coati* has a brownish-gray color and is found from Panama to southern Mexico, while the *red coati* is native to the northern part of South America. Both are closely allied to the raccoon and have an elongated snout,



MEXICAN COATI.

which is used in rooting up the earth when in search of worms and insects. The tail is long, covered with hair, and usually held erect. These animals have coarse hair, are about three feet in length, and easily climb trees.

COBALT (kō'bŏlt), a metal used to form compounds of commercial importance. It is brittle and compact, may be easily reduced to powder, and has a greenish-white or a steel-gray color. Cobalt is not found in a pure state, except in meteorites, but occurs with lead, iron, and other minerals. The most important American productions come from Mine la Motte, Mo., and Cobalt, Ont. Cobalt, when heated with alumina, yields a pigment known as *cobalt blue,* or *cobalt ultramarine.* The oxide of cobalt is used by enamelers and to produce a fine blue glaze on porcelain.

COBALT, a city of Ontario, in the Nipissing District, 330 miles north of Toronto, on the Temiskaming and Northern Ontario Railroad. It is in a rich cobalt and silver district and has been growing rapidly since 1903. It has several hotels, schools, churches, and industrial plants. Population, 1911, 5,638.

COBB (kŏb), **Cyrus,** sculptor and painter, born at Malden, Mass., Aug. 6, 1834; died Jan. 29, 1903. He graduated at East Boston and the Boston University Law School. His paintings include "Jesus Condemned" and "Warren at the Old South." He wrote "Thirty Sonnets on the Masters of Art" and "The Veteran of the Grand Army."

COBB, Darius, twin brother of Cyrus,

painter and writer. He graduated from the same schools. His productions include a number of excellent paintings and writings. Among the most noted paintings are "Christ before Pilate" and "Washington on Dorchester Heights." In connection with Cyrus, he produced a painting entitled "The Last Supper." He wrote many choice productions in poetry and prose for various periodicals, and was editor of the *Boston Traveler* for several years.

COBB, Henry Ives, architect, born in Brookline, Mass., Aug. 19, 1859. He received a common school education and studied at the Brookline high school, Boston School of Technology, and Harvard University. Later he studied with the architectural firm of Peabody & Stearns, Boston, and soon secured several awards in competitive exhibitions. He built some excellent structures, among them the private residence of R. R. Cable; the Studebaker mansion, South Bend, Ind., and the home of Dr. McGill in Chicago. Among the public structures erected by him are the Chicago Athletic Association building, Yerkes Observatory, and forty-six buildings of the University of Chicago. He designed the fisheries building at the Columbian Exposition in 1893 and the Federal building at Chicago.

COBDEN (kŏb'dĕn), **Richard,** statesman, known as "the apostle of free trade," born at Heyshott, near Midhurst, England, June 3, 1804; died April 2, 1865. After receiving an elementary education, he was apprenticed to his uncle as a clerk in a wholesale warehouse in London. In 1832 he settled at Manchester and established a cotton factory. He was an advocate of peace for England, and favored extending foreign commerce, but opposed intervention in the affairs of other nations by military force. With this end in view he was decidedly against the Crimean War and other foreign complications. His extreme views in favor of free trade led him to oppose all duties on corn. Extensive lecture tours through England and many pamphlets on the subject aided largely in the repeal of the Corn Laws in 1846. He entered Parliament in 1841 for Stockport. Later he was elected for the West Riding of York, which he served ten years, and in 1859 was chosen to represent Rochdale. He traveled extensively in Eurasia, America, and Africa. In lectures, addresses, and by the pen he was alike forceful, logical, and persuasive. His influence in promoting free trade extended beyond the borders of his own country.

COBLENZ (kō'blĕnts), or **Koblenz,** a fortified city of Rhenish Prussia, at the junction of the Rhine and Moselle rivers. It is one of the most securely fortified cities of Germany, the castle of Ehrenbreitstein being one of the strongest points. The fortifications can accommodate an army of 100,000 men. They contain magazines capable of holding provisions sufficient to support 8,000 men for ten years, and have reservoirs sufficient for supplying water for three years. Coblenz was fortified as a bulwark of defense against France. The city has several fine schools, pavements, electric lights, and rapid transit. Among the principal buildings are the Church of Saint Castor, founded in 836, the old Jesuit College, the public market, and the town hall. It has a considerable trade in corn, mineral water, and wine. The manufactures include clothing, furniture, machinery, cigars, and Japan ware. Coblenz was the capital of the department of Rhine-Moselle under the French in 1798 and became a part of Prussia in 1815. Population, 1905, 53,897; in 1910, 56,478.

COBOURG (kō'bûrg), a city of Ontario, capital of Northumberland County, sixty-eight miles northeast of Toronto. It is located on Lake Ontario, on the Grand Trunk Railway, has a commodious harbor, and is important as a port of entry. The manufactures include woolen goods, clothing, machinery, and spirituous liquors. It is the seat of a college and several fine schools and churches. The public utilities include electric lighting, waterworks, and a number of well-improved streets. Population, 1900, 4,239; in 1911, 5,074.

COBRA DE CAPELLO (kō'brà dâ kà-pĕl'-lō), the Portuguese name of a poisonous snake of India, meaning hooded snake. It is allied to the cobra or asp found in Northern Africa. The color is pale yellow or brownish-yellow with a



COBRA DE CAPELLO.

tinge of bluish-white beneath. The head is broad and at its rear has nine plates, and the neck may be expanded to cover the head like a hood. It is sometimes called the *spectacled snake,* owing to the appearance of a pair of barnacles on the neck that resemble spectacles, when the neck is expanded. It is from four to six feet long, is sluggish in habits, and is easily killed. Its food consists of lizards, eggs, frogs,

birds and small reptiles. It is an excellent swimmer and delights to invade the water in search of food. The bite is exceedingly poisonous, recovery from it being rare and death often resulting instantly or within a few hours. It is estimated that several thousand natives of India die from the bite of this snake annually. The poison is secreted in a gland located in the head of the serpent, and flows through a cavity of the tooth into the wound when the animal compresses its mouth upon any object. The government pays a bounty on the cobra head in order to extinguish it, but it is held sacred by some of the Hindu people, and is protected by them as a being that has power to injure. Indian jugglers charm the snake and have it serve their purpose in giving exhibitions. The animal may be taught to perform by music and keep time by swinging its head and body to the delight of spectators.

COBURG (kō'bo͝org), capital of the duchy of Saxe-Coburg-Gotha, Germany, on the Itz River, a tributary of the Main. It is noted for its palace of the Duke of Saxe-Coburg-Gotha and the ancient castle of the dukes of Coburg. In this castle Luther occupied apartments for some time, his bedstead and pulpit still being objects of interest. The public library has 60,000 volumes. It has manufactures of clothing, woolen and linen fabrics, and porcelain. The public utilities include electric street railways, a public park, and waterworks. Coburg was made the capital of Saxe-Coburg in 1735. Population, 1905, 22,488; in 1910, 24,844.

COCA (kō'kȧ), a shrub native to Peru. It attains a height of eight feet. In the Andes it is cultivated at an altitude ranging between 2,500 and 5,000 feet. The leaves are dried and mixed with powdered chalk and are chewed as a stimulant much like tobacco. Coca leaves contain an alkaloid *cocaine* and a waxy substance called *coca wax*. The habit of using it is as obnoxious among the Peruvians as the use of opium is among the Chinese.

COCAINE (kō'kȧ-ĭn), an alkaloid obtained from the leaves of the coca plant. The leaves of the plant are green, about two inches long, and the alkaloid is extracted by alcohol and a small quantity of sulphuric acid. It is a colorless, transparent drug, has a bitter taste, and is odorless. The drug is soluble in ether, and is used as a local anaesthetic. It is valuable as such in operations on the eye, ear, and other delicate organs of the body. When taken internally, it is a powerful nerve stimulant, and, if used persistently, causes nervousness and later insanity. Cocaine was first made in Peru in 1885, and vast quantities are now exported from that country and Bolivia to the United States and Europe.

COCCULUS INDICUS (kŏk'kŭ-lŭs ĭn'dĭ-kŭs), the fruit of a climbing plant native to the East Indies. It is about the size of a pea, has a dry exterior coat, and somewhat resembles the bayberry, but is very poisonous. The bitter principle, known as *picrotoxin*, when taken internally in poisonous doses, acts much like strychnine. It is used to destroy lice and the ringworm and for various purposes in medicine. The seeds are sometimes called *fishberries* from the circumstance that they stupefy fish. They are used to some extent by fishermen, who cast them into the water for the purpose of stupefying the fish so they may be easily caught by hand or in a small net.

COCCUS (kŏk'kŭs), a group of insects which include the bark lice, mealy bugs, scalelike insects, and a number of others. The species are very numerous and differ greatly in appearance, but in most of them the female is wingless and the male has a single pair of wings. They attach themselves to plants by inserting their beak, with which they suck the sap, hence are very injurious to hothouse and garden plants. These insects include those from which cochineal, gum lac, and kermes are obtained.

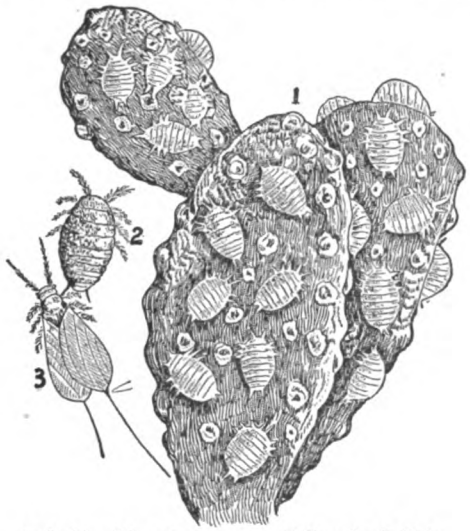
COCHABAMBA (kō-chȧ-bäm'bȧ), a city of Bolivia, capital of the department of Cochabamba, on the Rio de la Rocha. It is located in a fertile valley, has wide and regular streets, and has considerable trade in produce and merchandise. The manufactures include soap, leather, earthenware, and cotton and woolen goods. Among the chief buildings are a theater, two hospitals, several churches, and the government building. The city was founded in 1563. Population, 1916, 30,175.

COCHIN (kō-chēn'), a city of British India, a seaport in the district of Malabar, eighty miles southeast of Calicut. It is important for its large foreign and interior trade, has transportation facilities by railroads and steamship lines, and is the seat of extensive shipyards. Many classes of Asiatics and Europeans make up the inhabitants, who carry on a large trade in oil, cocoa, teak wood, and merchandise. Cochin was visited by the Portuguese under Vasco da Gama in 1503, but the Dutch captured it in 1662, when it was made a great emporium of trade. It has been a British possession since 1796. Population, 1916, 18,250.

COCHIN CHINA (kō'chĭn chī'nȧ), the name applied to the French colony in the southern extremity of the eastern portion of the Indo-Chinese peninsula. The designation is loosely attached to the former empire of Anam, which included three distinct regions: Lower Cochin China, Upper Cochin China, and Tonquin. Lower Cochin China is now the French colony of Cochin China. Upper Cochin China is the French protectorate known as Anam, and the remainder lying to the north is called Tonquin. These and Cambodia constitute the present French possessions in Southeastern Asia.

Cochin China occupies the southeastern extremity of the Indo-Chinese peninsula, and includes a small part of the territory embraced within the former empire of Anam. The area

is 23,182 square miles. It is bounded on the northeast by the region included in Anam, northwest by Cambodia, south and east by the China Sea, and west by the Gulf of Siam. It now has



1, Cochineal insects on cactus 2, Female; 3, Male.

a number of railroads and is extensively connected by telephone and telegraph lines, and many of its cities are in a growing condition. The chief products consist of rice, cotton, hides, domestic animals, fish, pepper, and tropical fruits. The French government has established free schools and erected a number of public buildings. There is a French army of about 2,000 soldiers, besides about that number of Anamese troops. The Mekong River furnishes an avenue for interior navigation. A number of the seaport cities have a large foreign and interior commerce.

The region was conquered with Anam by China in 214 B. C., and became independent as a part of Anam in 929 A. D., and in the early part of the 15th century was successful in a war against China. In 1517 it was made a part of the Portuguese possessions. Later it was conquered by the Dutch, and in 1789 became tributary to France. The population is 2,976,521, of which 5,000 are French settlers and traders.

COCHINEAL (kŏch'ĭ-nēl), an insect found native on the cactus plants of Mexico and Central America. It has been naturalized in the warmer portions of Eurasia and Africa. The value of the insect consists of its importance in preparing *cochineal*, an article used in producing scarlet colors and in making carmine and lake. However, the commercial product is obtained only from the females, which outnumber the males in the proportion of about 150 to one male. Each of the females lays about 1,000 eggs, and the crops are picked in the period from December until May. The insects are brushed off the plants and killed by the heat of the sun or in an oven. A single pound of cochineal contains about 70,000 of the insects. The value of these insects was first discovered by the Spanish in 1518.

COCHRANE (kŏk'ran), **Thomas,** tenth Earl of Dundonald, born at Annsfield, Scotland, Dec. 14, 1775; died Oct. 31, 1860. He joined the navy at the age of eighteen, was made a lieutenant in 1796, and rendered efficient service against the French in the Mediterranean Sea. In 1806 he was elected a member of the House of Commons, where he made many enemies by exposing the abuses practiced in the navy. The government of Chile invited him to organize and command its navy, and he went to Valparaiso in 1818, where he rendered much aid in obtaining independence from Spain. In 1820 he captured Valdivia, Chile, and subsequently aided in reducing Lima and Callao. He became first admiral of the Brazilian navy in 1823 and the same year compelled the Portuguese to evacuate Bahia, and in 1828 took charge of the navy of Greece. In 1831 he succeeded his father as peer of England, where he spent the remainder of his life. He published "Narrative of Services in the Liberation of Chile, Peru, and Brazil."

COCKATOO (kŏk-ȧ-tōō'), the name applied to a genus of birds of the parrot family. They have a large head crowned by a tuft of long and pointed feathers. The bill is strong and curved from the base, and the plumage is bright, com-



AUSTRALIAN COCKATOO.

monly white in color, but sometimes mixed with red, blue, and yellow. The name was given to these birds on account of their peculiar utterance, screamed out harshly. They are able to acquire a few words, but are not possessed of

much imitative power. The chief food consists of fruits, seeds, and small insects. Australia and the Eastern Archipelago are well populated with these birds, where they live in large tribes and may be easily domesticated.

COCKBURN (kō'bûrn), **Sir Alexander James Edmund,** jurist, born Dec. 24, 1802; died in London, England, Nov. 20, 1880. He studied at Trinity Hall, Cambridge, was admitted to the bar in 1829, and became Queen's Counsel in 1841. His pleading before committees of Parliament attracted attention, and he was elected as a member of that body from Southampton, in 1847, where he became noted for ardor and eloquence in supporting the foreign policies of Palmerston. He was made Solicitor General in 1850, and after successive promotions became Lord Chief Justice of England in 1859, holding the office until his death. As a barrister he conducted many celebrated cases, including the famous Tichborne Case, and represented Great Britain in arbitrating the Alabama Claims, over which a long controversy had taken place with the United States.

COCKCHAFER (kŏk'chā-fĕr), a class of beetles widely distributed in Europe and North America. The larvae live from two to five years in meadows and pastures, where they burrow in the soil and feed on the roots of the grass. In the adult state they are about an inch long and live only a few days, hence they do little damage to the leaves of trees upon which they feed. This class of insects is known in England as *May bugs* and in America as *June bugs,* since they come out of the ground in May or June. In some seasons they occur in great numbers, though usually they are not regarded as a pest, except in some meadows and strawberry patches.

COCKLE (kŏk'k'l), a common name for several species of bivalve mollusks. They are found in the sandy shores of the sea, have a heart-shaped form, and are much used as food. The cockle is nearly equivalvular, with a hinge fastening the two parts.

COCKLEBUR (kŏk'k'l-bûr), or **Clotbur,** the name of several species of troublesome weeds found in most of the continents, especially in the Temperate zones. One species, the *xanthium canadense,* is native to North America, and two other species were introduced from Europe. The species known as *xanthium strumarium* is particularly troublesome in the fields of Southern Canada and most sections of the United States. The plant is branching, has coarse heart-shaped leaves, and grows to a height of from one to four feet. It is an annual plant and produces burs about an inch long covered with stout prickles. The burs have two cells and retain their vitality a number of years, hence it is difficult to rid fields of them, except by seeding the ground in timothy and clover, or some other perennial grasses, thus preventing the plants from seeding. Cockleburs are injurious to the wool industry as the burs fasten themselves in the wool, hence stringent laws are in force in the south of Africa and other continents to eradicate the obnoxious weed.

COCK OF THE ROCK, a bird found in the northern part of South America. It is about the size of a large pigeon, has orange colored plumage, and the head is crowned by a beautiful flattened crest. These birds are so named from their habit of building nests on rocks near rocky watercourses and on bushy hillsides. The males court the females by assembling in cleared places, where they display their plumage until chosen as a mate by some observant female. The skins are valued for millinery purposes and command a high price in the market.

COCKRAN (kŏk'ran), **William Bourke,** American public man, born in Ireland, Feb. 28, 1854. He emigrated to the United States in 1871, where he secured an education and taught school in Westchester County, New York, for five years. In 1876 he was admitted to the bar and became distinguished as an able advocate. He served as a commissioner to revive the judiciary clause of the constitution of New York. As a leader in Tammany Hall and in Democratic politics he attained much success. He was elected to Congress in 1888 and again in 1892. As a public speaker and debater in Congress and on the lecture platform few public men have given evidence of greater strength of voice and skill in argument. In 1896 he supported President McKinley on account of being opposed to the principal of bimetallism. In anti-trust and colonial discussions following the war with Spain he supported the Democratic party, and was an advocate of the election of William J. Bryan in 1900. He was again elected to Congress in 1904, 1906, and 1908; subsequently he practiced law.

COCKROACH (kŏk'rōch), a genus of insects belonging to the order having straight wings. The Oriental or proper cockroach is thought to have come originally from India, but is now found widely distributed. In the male the wings are half the length of the body when mature, while in the female they are but rudimentary. The body is oval, elongated, and has a well-marked smoothness on its upper surface. The eggs remain in the abdomen of the female for six or eight days, when they are attached to some solid body by means of a gummy fluid secreted by glands. Several species of cockroaches in America are widely distributed, some of which attain a length of from two to three inches. The *Croton bug,* so named from the Croton Aqueduct of New York, has followed man to all parts of the globe and is confined chiefly to the larger cities. Cockroaches are nocturnal in habit, have a ravenous appetite, and leave an unpleasant scent on food that they are unable to devour.

COCOA (kō'kō), or Cocoa Palm, the best known and most prized of the palm trees. It is found on the coasts of islands and continents having a warm climate, and is common to the

West Indies, South America, India, and the East Indies. The tree thrives best near the seacoast, but rare ones are found at an elevation of 2,500 feet above the sea. It attains a height of from sixty to ninety feet. The trunk is slender and is marked by scars when the leaves have fallen off, these constituting transverse rings. In most cocoa trees the rings serve as a means of ascending the trees to secure the fruit, and are used for that purpose by the natives. The leaves grow in the form of a bunch or tuft at the top, are from twelve to fifteen in number, and are of gigantic size. About eighty to one hundred nuts are produced on an average tree. They are used for various purposes in the pro-



COCOA. TREE AND FRUIT.

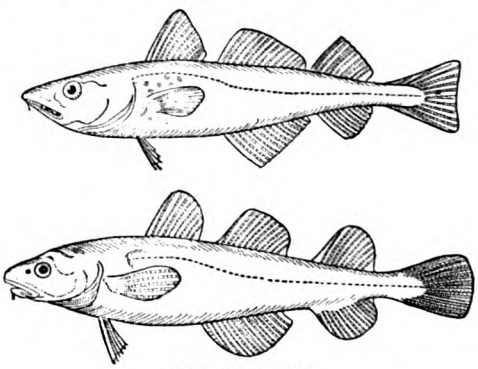
duction of food and other articles valuable in commerce. The terminal bud is considered a delicate food. The leaves are used for baskets, buckets, and thatched dwellings. In a number of localities fences are made of them, and they also serve as a substitute for writing paper. The midribs of the leaves are used for oars, while their ashes yield potash, and a portion is used in cradles and in the manufacture of clothes. The stem of the leaves serves in making drums and in constructing huts and furniture. The roots yield medicines and serve the natives as a chewing substance. Chocolate (q. v.) is not the product of this tree, but of the cacao, or cocao tree, which has undivided leaves and clustered flowers and is native to tropical America.

COCOANUT, the fruit of the cocoa palm growing in tropical countries. It is from three to eight inches in length, covered with a fibrous husk, and contains a fleshy kernel. It is an agreeable article of food and is used for various purposes in manufacture. The interior of the nut is of a whitish color and contains a milkish white fluid. In some regions large quantities are dried before the oil is expressed, when the product of the kernel is known as *copra*. The fibrous covering is used in the manufacture of yarn, matting, and cordage, and is known as *coir*. Cups and vessels are made from the hard shell of the nuts, which, when polished, serve a useful purpose. The wood of the tree is used in the construction of houses and for other building purposes. The tree yields a sweetish liquid called *toddy*, which, when distilled, forms a spirit called *arrack*. A sugar is obtained from the juice known as *jaggery*. The nut produces the *cocoa butter*. This butter is used as a substitute for creamery butter, and is sometimes mixed with butter and colored with a butter coloring. It is usually yellowish white and has a weak chocolate odor and an agreeable taste. It does not become rancid when kept.

COCOON (kō-kōōn′), the outer covering of silky fibers or hair with which the pupae of many insects are protected. This silky fiber is formed in some insects, as in caterpillars, some varieties of spiders, and silkworms. The cocoon gathered from silkworms is the article from which silk is manufactured.

COD, the name of a cape and bay in the eastern part of Massachusetts. They were so named from the large number of codfish that abound in and near the bay. See **Cape Cod.**

COD, a valuable food fish abundant in the waters off Newfoundland and throughout the temperate seas of Eurasia and America. There are several well-defined species, all belonging to the soft-finned fishes. They feed mostly in water about twenty-five to sixty fathoms deep, and weigh as much as a hundred pounds. They spawn from January to May, at which season great numbers crowd together. In two years the young fish become marketable and reach maturity at the end of three years, when they weigh about sixty pounds. The best months for cod fishing are October, November, and December.



COMMON COD.
TOM COD.

The codfish is a good biter at almost any kind of bait and ordinarily feeds on worms, mollusks, and small fishes. It is a valuable fish for food, while isinglass is made of its bladder and cod-liver oil from its liver. Cod-liver oil was recommended as early as 1833 for diseases of the lungs and in cases of chronic rheumatism. Cod-

fish are caught mostly with hooks and lines, one man being able to catch from 300 to 500 in a day. However, most of the fishing is done by the aid of schooners, from which the fishermen put out long lines called *trawls*, and to these are attached shorter baited lines. The fish are taken off the lines from time to time and are immediately dressed and salted. Some of the best cod fisheries are adjacent to Newfoundland and off the coast of Norway.

CODDINGTON (kŏd'dĭng-tŭn), **William,** founder of the colony of Rhode Island, born in Boston, England, in 1601; died Nov. 1, 1678. He arrived in the Plymouth Colony in 1630 and was a trader at Boston several years. He defended the views of Ann Hutchinson and in 1638 removed to the island of Aquetuck, now Rhode Island, where he founded a colony that was to be "judged and guided by the laws of Christ." In 1640 he was elected governor and held office until 1647, when Rhode Island was incorporated in the charter with the Providence Plantations. He went to England and received a commission to govern Aquetnck Island for life, but the colonists considered that this deprived them of their rights and he resigned. In 1666 he adopted the tenets of the Quakers, and was governor of Rhode Island from 1674 until his death.

CODE NAPOLÉON, the laws of France promulgated between 1804 and 1810, which are contained in the so-called Five Codes. The laws of France were greatly diversified at the time of the Revolution and a general or national code was demanded by the people. Napoleon promulgated the first code, generally known as the "Civil Code of France," to which additions were made subsequently, and the title was changed to Code Napoléon in 1807. Few new laws were introduced, but those in existence were codified and edited so as to present simple and clear statements. It may be said that the Code Napoléon harmonized the customary laws of the German provinces in the north with the laws of southern France. The rapid rise of French power caused these laws to be adopted in many countries of Europe before 1814, and many of them are still in force in Belgium, Italy, and Holland. The code of Louisiana and those of a number of republics in Central and South America are based upon the Code Napoléon.

CODEX (kō'dĕks), the name applied to the wooden tablets coated with wax and used for writing by the ancients. Subsequently the name was applied to all large manuscripts, as the works of the poets and historians, and under the emperors of Rome it designated collections of civil and ecclesiastical laws. The oldest and most celebrated collections of civil laws are those known as the "Codex Theodosianus" and "Codex Justinianus." In more recent times the term came to be applied more generally to the ecclesiastical writings, such as the "Codex Alexandrinus," which is written on parchment and contain the entire Greek Bible, except the books of Matthew, John, and II. Corinthians. In this work the Old Testament is in the Septuagint version. The "Codex Rescriptus" is an ancient parchment on which the original writing has been defaced and upon which a different composition has been copied. A parchment of this kind is now called a palimpsest. See **Palimpsest.**

COD-LIVER OIL, a fixed oil obtained from the livers of the cod, ling, torsk, and other related species of fish. The adipose tissue of these fish is confined almost entirely to the liver, from which it is obtained by heat or by pressure in a cold state. Formerly the fishermen put the livers in barrels, where they were kept from one to four months, during which time they underwent putrefaction and the oil would rise to the top and be drawn off into vessels. The oil is now obtained in a much cleaner way by simply heating the fresh livers for two or three hours, after which the oil is pressed out. Cod-liver oil has a pale yellow color and is a better food than any other oil. It is easily digested and is valuable as a food in consumption and other wasting diseases. The taste is very disagreeable, hence it is administered in various ways, frequently in capsules. A preparation known as *emulsion* has a milky appearance and is made by mixing a number of remedies with cod-liver oil, usually such as chloroform elixir of sacchrin, malt extract, alcohol, oil of bitter almonds, sodium bicarbonate, etc. A tablespoonful taken three times a day is a common dose of the pure oil.

CODRUS (kō'drŭs), in Greek history, the son of Melanthus and the last King of Athens. It is supposed that he lived about 1068 B. C. The oracle declared that the people of Athens would be victorious if their king should be slain, hence Codrus sacrificed himself by entering the camp of the enemy in disguise and being slain after provoking a violent quarrel with the common soldiers. The Dorians, who had invaded Athens, abstained from hostilities as soon as they learned of the death of Codrus and returned home, and the Athenians, thinking no one worthy to succeed Codrus, abolished the royal dignity and instituted in its stead the office of *archon.* Medon, son of Codrus, was the first archon.

CODY (kō'dy), **William Frederick,** better known as Buffalo Bill, American frontiersman, born in Scott County, Iowa, Feb. 26, 1845. He spent the early years of his life among the Indians. In the Civil War he rendered valuable service as a Union scout. When the Union Pacific Railway was in a state of construction, he closed a contract with the Goddard Brothers to furnish fresh buffalo meat for a certain period, on account of which he was named "Buffalo Bill." Under this contract he delivered 4,280 buffaloes. Later he became engaged in several raids against the Indians and settled at North Platte, Neb., where he established a large cattle ranch and engaged in the raising of buf-

faloes. Later he collected a band of Indians, rough riders, cowboys, unbroken bronchoes, and a herd of buffaloes and organized his famous "Wild West" show. After visiting the principal cities of America, he made a tour through Europe and returned to the World's Columbian Exposition in 1893, where he met with much success. His exhibitons in Europe were visited by many of the crowned heads of various nations. His biography was written by one of his associates, John M. Burke, known as "Arizona John," under the title of "Buffalo Bill, from Prairie to Palace." He is one of the best known showmen of America and as such was among the most successful. He died Jan. 10, 1917.

COEDUCATION (kō-ĕd-ū-kā'shŭn), the association of males and females for instruction in the same institution, school, or class, each receiving the same training and culture. This system prevails generally in the elementary public schools of the United States, being the most convenient and economical, except in a few large cities, such as New York and Boston. This practice appears to receive, not only the tolerant assent of parents as a necessity, but unqualified approval is given in most cases on the ground that it is the best to be adopted. However, nearly half the private elementary schools have separate instruction and courses of study for boys and girls, and in 1908 about eight per cent. of the pupils receiving elementary instruction attended such schools.

Those who oppose coeducation give a number of reasons in support of their views. Among these is the chief one that mixed schools do not provide instruction and discipline quite as well fitted to the peculiarities of the sexes. They think that the manners of the girls are influenced unfavorably by the coarser conduct of the boys, and that on the other hand the boys receive little or no benefit from the presence of the girls. Some think that there is a liability of influencing unfavorably the moral character of each, which is guarded against by preventing the constant presence and intermixing of the sexes in the classes and on the playground. Those who favor coeducation, on the other hand, think that the presence of the girls tends to improve discipline and stimulate self-respect and politeness. It is held by this class that both instruction and one-sided training is prevented, and that interest will center in such studies as mathematics as well as literature and poetry when both sexes meet in recitation work. So far as moral tendencies are concerned they think daily association of the sexes is healthful and provides a general uplift and induces a tendency toward the practice of the good rather than toward the more base.

It must be observed that coeducation is gaining ground steadily in America as well as in the more progressive countries of Europe. This is true particularly of England and Germany, though the gymnasiums and *realschulen* of Germany are with few exceptions for boys exclusively. The last few years a struggle of women for admission to the universities of Germany has been going on, and resistance has not only given way to a considerable extent, but many advocate coeducation who formerly opposed it, being satisfied by a practical test that coeducation has many advantages. In England and Scotland women are admitted to nearly all the universities, though exception is made in some to their admission where law and medicine are studied, while in Australia women are not only admitted as students, but are given places as lecturers and professors, and wider privileges have been extended in Austria and Russia. All the universities of Switzerland are open to women on the same terms as to men. In 1908 there were 5,450 coeducational high schools in the United States out of a total of 5,500, while the private secondary schools, which number 1,960, included 325 for boys and 550 for girls, while 1,085 were coeducational. Practically the same proportion of coeducational schools are maintained in Canada.

In speaking of separate schools for the sexes Jean Richter said: "To insure modesty, I would advise the education of the sexes together; for two boys will preserve twelve girls, or two girls twelve boys, innocent, amidst winks, jokes, and improprieties, merely by that instinctive sense which is the forerunner of natural modesty. But I will guarantee nothing in a school where girls are alone together and still less where boys are." Dr. Clark, in his work entitled "Sex and Education," says: "Boys must study in a boy's way, and girls in a girl's way. Appropriate education of the two sexes carried as far as possible is a consummation most devoutly to be desired; identical education of the two sexes is a crime before God and humanity, that physiology protests against, and that experience weeps over." President Fairchild, of Oberlin, said: "During my experience as professor—twenty-seven years in all—I have never observed any difference in the sexes as to performance in recitation." James Burrill Angell, president of the university of Michigan, said: "We have not had the slightest embarrassment from the reception of women. They have done their work admirably, and, apparently, with no peril to their health." In speaking on this subject, Caroline Wells no doubt expressed the correct view in saying: "Education is to be adapted neither to boys nor to girls, but to individuals. The mother, or the teacher, has learned little who attempts to train any two children alike, whether as regards to the books they are to study, the time it is to take, the attitudes they are to assume, or the amusements they are to be allowed."

COELENTERATA (sē-lĕn-tē-rā'tà), a branch of the animal kingdom, the next to the lowest of the types of Metazoa, which include the polyps and jellyfishes. The body cavity

and circulatory system are not distinctly separate, but the food enters through the mouth into a system of chambers or tubes, which take the place of the body cavity and of the digestive system. Most of the coelenterates live in the sea, only a few inhabiting fresh water. The jellyfish is not regarded as a true member of this class of animal life and is a free-swimming organism, while the corals, hydroids, and sea anemones are fastened to some object during their natural life. The sponges, though classed with these animals, have no tentacles.

COEUR D'ALENE (kĕr-dā-lĕn'), an important city in Idaho, county seat of Kootenai County, near the border of Canada, in the northwestern part of the state. It is on the Northern Pacific, the Chicago, Milwaukee and St. Paul, and other railroads. An electric railway connects it with Spokane. It is visited by many tourists. Population, 1910, 7,291.

COFFEE (kŏf'fē), a genus of shrubs cultivated in warm climates, native to Abyssinia and Arabia. The coffee plant is now grown in the West Indies, Bermuda, and the tropical climates of America and other continents. About fifty species are grown for commercial purposes. Those producing the coffee seeds of the market attain a height of from fifteen to twenty feet in the native state, but they are treated usually so as not to exceed more than ten feet. In this way the production is increased largely, since the seeds grow mainly on the smaller and newer twigs. The seeds or beans are destitute of flavor in a raw state, but in roasting a peculiar brown oil, known as *caffeine*, is developed, and this gives to coffee its beautiful aroma. Caffeine is the most valuable constituent of coffee, and is identified closely with the alkaloid *theine* found in tea. It is found in roasted coffee in a proportion of about one per cent. Coffee is ground and made into a drink which constitutes one of the most wholesome beverages known. It assists digestion, retards waste, and exhilarates the spirits. It is adulterated with chickory in a ground form, and is sometimes mixed with figs, malt, and raisins. The best way to avoid adulteration is to use only the coffee beans and grind them as the coffee is needed for household use.

Among the different kinds of coffee are *Mocha*, secured from the region of the Red Sea; *Java coffee*, *Jamaica coffee*, and the *Rio coffee* of South America. Coffee was entirely unknown to the ancient Greeks and Romans. The Dutch first brought the coffee plant to other lands and cultivated it. Seeds were brought to Java about 1690, and to Brazil and South American countries in 1774. The production is continually increasing. The world's annual output is about 1,550,000 tons, more than one-half of which is grown in Brazil. Other countries that are extensive growers of coffee include Mexico, India, the Dutch East Indies, Arabia, and Central America. The United States and Canada secure their supply principally from Brazil. According to recent authority, the consumption of coffee in Holland is



COFFEE PLANT.
A, Flower; *B*, Fruit Stock; *C*, Fruit; *D*, Section of Fruit

twenty-three pounds per year for each person; Belgium, eleven; United States, ten; Germany, six; France, four; Great Britain, one.

COFFEYVILLE, a city of Kansas, in Montgomery County, 170 miles southwest of Kansas City, on the Santa Fé, the Missouri Pacific, and other railroads. It is nicely located on the Verdigris River and is surrounded by a fertile country which produces fruits and cereals. Coal, petroleum, natural gas, and potter's clay are obtained in the vicinity. The manufactures include flour, pottery, brick, machinery, and cigars. It has a number of fine schools and churches, gas and electric lighting plants, waterworks, and a public library. The first settlement in its vicinity was made in 1869 and it was incorporated two years later. Population, 1900, 4,953; in 1910, 12,687.

COFFIN (kŏf'fĭn), a box or chest in which a corpse is inclosed for burial. Coffins were used by the ancients mostly for the bodies of distinguished persons. They are mentioned in the Scriptures in relation to the embalmed body of Joseph. The Egyptians used wooden coffins and sometimes placed the bodies in caskets of stone and baked clay. The Romans and Greeks employed cedar wood in constructing coffins, and in later times the former practiced cremation, placing the ashes in urns. However, the Greeks placed many corpses in coffins made of a limestone known as *sarcophagus*, which absorbed the tissues of the body in a few weeks, and the name soon came to be applied to the coffin itself. The Christians introduced the extensive custom of burying in coffins. Those used in modern times are made of wood or metal.

COFFIN, Charles Carleton, journalist and author, born at Boscawen, N. H., July 26, 1823; died Mar. 2, 1896. He began life on a farm and attended the public schools. Later he engaged in engineering, and subsequently took up journalism in Boston. During the Civil War he was the correspondent in the field for the *Boston Journal,* and in 1866 reported the events of the Austro-Prussian War to the same newspaper. He made a tour of the world shortly after, and, on returning to America, became popular as a lecturer. In 1884 he was elected to the Legislature of Massachusetts, serving two years. His books were read extensively and appeared under a number of widely different titles. They include "Following the Flag," "Our New Way Around the World," "The Seat of Empire," "Old Times in the Colonies," "Building the Nation," "The Drum-Beat of the Nation," "Days and Nights on the Battlefield," and "Life of Garfield."

COGNAC (kŏn-yăk′), a town of France, in the department of Charente, twenty-five miles west of Angoulême. It is situated on the Charente River, has an old castle in which Francis I. was born, and is famous for the manufacture of Cognac brandy. The surrounding country is devoted largely to the cultivation of the vine. Among its improvements are electric lights, a public library, and extensive transportation facilities by railways. Population, 1916, 19,590.

COHESION (kŏ-hē′zhŭn), the force by which molecules of the same kind or of the same body are held together. It is strong in solids, weak in liquids, and absent in gases. It varies with the nature of the bodies and with the arrangement of the molecules in the same body. Thus, the tempering of steel alters the molecular arrangement in that substance, with the effect also of altering its cohesion. The hardness, ductility, and tenacity arise from modification in the cohesion of substances. See **Adhesion.**

COHOES (kŏ-hōz′), a manufacturing city of New York, in Albany County, at the confluence of the Mohawk and Hudson rivers. It is on the Erie and Champlain canals and on the New York Central and the Delaware and Hudson railroads. The chief buildings include the public library, the high school, the Episcopal Saint John's church, and the Roman Catholic Saint Bernard's church. It has iron foundries, machine shops, rolling mills, knitting mills, pin and needle factories, cotton mills, and furniture factories. Cohoes ranks as one of the leading manufacturing cities on the Hudson and has a large trade in produce and merchandise. Gas and electric lighting, pavements, waterworks, public parks, and rapid transit are among the improvements. It was settled by the Dutch about 1630 and was chartered as a city in 1870. Population, 1905, 24,183; in 1910, 24,709.

COINAGE (koin′ăj), the process of making money of metal by stamping certain characters upon it, giving it a definite legal current value. Coinage was practiced early in history, the first mention of brass money being made by Homer in 1184 B. C. The Lydians coined money of gold and silver. The most ancient coins now extant were made in the 5th century B. C. In Rome metal money was made of brass previous to 269 B. C., at which time Fabius Pictor began to coin silver, and gold was coined in 206 B. C. The early coin money of Rome contained the heads of deities, or those statesmen and warriors who had been granted divine honors. Julius Caesar was the first living Roman whose portrait was placed on coins, and the example was soon followed by various rulers in other nations. Much of the coin money of ancient times was made of iron and brass, but gold and silver were used more or less by the richer nations.

In Great Britain the coinage is regulated by Parliament, although the prerogative of coining is vested in the crown. The coinage of Canada is regulated by the Dominion Parliament and is directly in charge of the deputy master and the superintendent of the royal mint. Silver is used for small change in Canada, and the coins are of the same denominations and have the same names as those of the United States. Although gold is coined extensively, it is rarely seen in circulation, practically the whole stock in the country being held by the government against the issue of legal tender notes and as reserves in the banks.

The first coinage laws of the United States went into effect in 1792. They provided a double standard, that of gold and silver, the latter of equal legal value, coined fifteen times greater in weight than the former. Since then various changes have been made, which are fully explained in other articles. The metric system is used to a certain extent in determining the weight of silver coins, and the monetary system is based on the most convenient scale of increase and decrease. Gold coins at the present time consist of double eagles, eagles, half eagles, three dollars, quarter eagle, and the dollar. The coins of three dollars and one dollar are quite rare. The silver coins consist of dollar, half-dollar, quarter-dollar, and dime, or ten cent, pieces, while the minor coins of nickel and bronze include five-cent, three-cent, and one-cent pieces. See **Mint.**

COIR (koir), the fiber of the cocoanut and other palms, used in the manufacture of ropes, mats, bags, cables, etc. The fiber is obtained from the husk and is divided into two classes, the outer or ordinary fiber and the inner or brush fiber. Mats are made largely of the ordinary fiber, which is the coarser and less durable, while the brush fiber is the finer product and is shipped in great quantities to the manufacturers, who use machinery in making cable yarn and yard matting. The waste or refuse of coir supplies the stuffing for mattresses and other commercial products.

COKE (kōk), an article of fuel obtained by

heating coal in ovens, or other devices, where little air is admitted. It is often prepared in heaps, but generally in ovens built for the purpose. The heat is applied until the volatile constituents have been expelled; thus, the coke consists largely of impure forms of carbon and contains earthy matter and often some sulphur. It is brittle, hard, and porous, and floats in water until it becomes saturated, when it sinks. Coke produces an intense heat when burnt, gives off no smoke, and is useful for cooking purposes and in manufactures. It is valuable in separating metals from their ores and for refining and smelting. Coal coke is formed in the manufacture of coal gas, being a residue left after all the gas has been distilled. Coal yields from sixty to seventy per cent. of coke. Large quantities of coke are made in Pennsylvania, West Virginia, Germany, and England.

COKE, Sir Edward, jurist, born at Mileham, England, Feb. 1, 1552; died Sept. 3, 1634. He studied at Trinity College, Cambridge, was called to the bar in 1578, and became recorder of Norwich in 1586. Subsequently he was recorder of London and in 1593 was elected a member of Parliament. He was chosen speaker of the House of Commons, and later as Attorney-General conducted the prosecution of Sir Walter Raleigh in 1603 and the Gunpowder plotters in 1605. He was made Chief Justice of the Common Pleas in 1606, and seven years later became Chief Justice of the King's Bench and afterward Privy Councilor, but was expelled from the latter office and committed to the Tower in 1621 because of his opposition to James I. In 1628 he again entered Parliament and took an active part in framing the Petition of Right, which was presented in the third Parliament of Charles I. His disposition was intolerant and his religious advocacy was fanatical, but he won popularity by his courage in supporting the commons against the crown. Among his writings are "Coke Upon Littleton," "Reading on Fines," and "The Complete Copyholder."

COKE, Thomas, first bishop of the Methodist Episcopal Church in America, born in Brecon, Wales, Sept. 9, 1747; died May 2, 1814. He was educated at the University of Oxford, took orders in the Church of England in 1770, and two years later was converted to the teachings of Wesley. In 1784 he was appointed bishop for America and made nine visits to that continent, preaching and organizing churches in many parts of the United States. He preached the Gospel in many parts of Great Britain and Ireland, founded missions in Gibraltar and the East and West Indies, and died of apoplexy while on the voyage to Ceylon, where he expected to establish a foothold of the church. His writings include "Life of John Wesley" and "History of the West Indies." He edited several religious works and published a commentary on the Scriptures.

COLBERT (kōl-bâr'), **Jean Baptiste,** eminent statesman, born at Rheims, France, Aug. 29, 1619; died Sept. 6, 1683. He served an apprenticeship in a woolen mill, and afterward went to Paris, where he was employed in the government service. He became chief minister to Louis XIV. in 1661. By his careful administration the financial condition of France was improved greatly and the public revenues were more than doubled. His wise management led to the construction of canals and roads, the enlargement of commerce, and various improvements in agriculture and industrial arts. The colonies were improved greatly by a careful application of an amended code of laws made under his direction. Science, architecture, and economic conditions were extended greatly by government appropriations and the judicial administration of the law. The public services of Colbert were not appreciated by the French king, and he died in disappointment. The titled nobility of France made his official career unpleasant in many instances on account of his humble birth. However, he rose much above many of his contemporaries, when measured from the standpoint of integrity and personal worth.

COLBURN (kōl'bûrn), **Warren,** educator, born in Dedham, Mass., March 1, 1793; died Sept. 13, 1833. He graduated at Harvard College in 1820 and opened a private school in Boston. In 1821 he published "First Lessons in Intellectual Arithmetic," which became very popular and was translated into a number of European languages. As a lecturer on commerce, physics, astronomy, and natural history he became well known, and for some time was an examiner in mathematics at Harvard.

COLBY COLLEGE (kōl'bĭ), an educational institution founded at Waterville, Me., by the Baptists in 1813. It was first named Waterville College, but changed to Colby University, in honor of Gardener Colby, a philanthropist, by whose generosity the institution prospered greatly. In 1899 the name was changed to Colby College. It has departments for the education of both sexes. The library has 58,500 volumes. It has an attendance of about 475 students.

COLCHESTER (kōl'chĕs-tẽr), a river port of England, in Essexshire, 50 miles northeast of London. It is located on a hill near the south bank of the Colne River, twelve miles from the sea, and has electric and steam railway facilities. The manufactures include boots and shoes, clothing, and machinery. Among the public utilities are waterworks, public baths, a public library, and substantial street paving. It is the seat of the Albert School of Science and Arts. Colchester is an old town and dates prior to the Roman invasion. Many ancient vases, urns, and coins of imperial Rome have been found in the vicinity. Population, 1916, 40,425.

COLCHICUM (kōl'kĭ-kŭm), a genus of plants allied to the lilies. The meadow saffron is a species of colchicum. About thirty other

species have been described. They are stemless and thrive in meadows and pastures. The plants attract little attention in the spring, but the flowers are beautiful and appear from August to October. Most species are acrid and poisonous, but some yield valuable medicine for gout and inflammatory rheumatism.

COLD HARBOR, a locality in Hanover County, Virginia, about ten miles northeast of Richmond. It was the seat of several battles in May and June, 1864, between the Union and Confederate armies. The first battle began on June 1 and continued three days. Gen. Grant commanded the Federal forces and had advanced from Spottsylvania to Chickahominy. Gen. Sheridan occupied Cold Harbor, where he was joined on June 1 by forces from Butler's army. The assault made on the Confederates was partially successful, but resulted in a loss of 2,000 men to the Union army. An attack was made on the right flank of the Confederates on June 3, but little advantage was gained, though 7,000 men were lost. Later the Federal army gained some advantage by the battles at Petersburg. The several battles at Cold Harbor cost the Union army almost 13,000 men, while the Confederates lost not over 2,000.

COLD STORAGE, a system of preserving perishable articles of food, such as eggs, meats, and vegetables. Cold storage plants are very common in the cities having a population of 10,000 or more, and are controlled and operated as private enterprises. They are usually divided into a number of rooms or departments, and in nearly all cases are associated with plants maintained for the manufacture of artificial ice. The articles preserved in cold storage are placed in rooms where the temperature is little above the freezing point, whereby it is possible to preserve perishable articles of food so the market can be supplied with choice varieties in good condition at all times of the year. Cold storage is used in large hotels and breweries, and in the transportation of butter, fruits, vegetables, and meats. Furs are kept in summer to a considerable extent in cold storage.

COLDWATER, county seat of Branch County, Michigan, on Coldwater River, about forty miles southeast of Kalamazoo. It is located in a fertile agricultural country, on the Lake Shore and Michigan Southern Railroad, and is a prosperous trading and manufacturing center. The city is the seat of a State school for indigent children. Among its institutions are a public school building costing $100,000, a fine courthouse, and numerous churches. Electric lights, pavements, and a library are among the facilities. It was settled in 1830 and became an incorporated city in 1862. Population, 1904, 6,225; in 1910, 5,945.

COLE, Thomas, landscape painter, born at Bolton le Moors, England, Feb. 1, 1801; died in Catskill, N. Y., Feb. 11, 1848. He came to America with his parents, who settled at Steubenville, Ohio. After painting in various cities with little success, he located as a landscape painter in Philadelphia in 1823. A number of his pictures were exhibited in the Royal Academy in 1830. He traveled through England, Germany, France, and Italy, but his best landscapes are those made in the Catskill Mountains. Among his celebrated paintings are "View of the White Mountains," "Mount Aetna," and "Voyage of Life." The last mentioned has been reproduced largely in engravings and used for illustrating popular books. It represents four phases of human life—childhood, youth, manhood, and old age.

COLERIDGE (kōl'rĭj), **John Duke, Baron,** jurist, born in Devonshire, England, Dec. 3, 1820; died in London, June 4, 1894. He was the son of John Taylor Coleridge and a nephew of Samuel Taylor Coleridge. He was educated at Oxford and admitted to the bar in 1847. In 1855 he became recorder of Portsmouth, was called to the bar as a queen's counsel in 1861, and represented Exeter in the House of Commons from 1865 to 1873. In the latter year he became Chief Justice of Common Pleas, and, on the death of Sir Alexander Cockburn, was promoted to be the Lord Chief Justice of England. He visited the United States in 1883 on the invitation of the New York Bar Association. He was a gifted, scholarly, and eloquent man, and was keen in wit and thorough in scholarship.

COLERIDGE, Samuel Taylor, poet, born at Ottery Saint Mary, England, Oct. 21, 1772; died July 23, 1834. He was educated at Christ's Hospital, where he was a school-fellow of Charles Lamb, acquired extensive knowledge of Greek before his fifteenth year, and became an expert reasoner in metaphysics. In 1791 he entered Cambridge, where his whole time was given to classics. He became despondent while at college and did not take a degree. His straitened circumstances in money matters caused him to leave college and enlist in a dragoon regiment under an assumed name, but he did not advance materially in military skill. His classic acquirements were discovered by one of the officers, which caused his condition to be known to his friends, who obtained his release from the army. He engaged in lecturing and preaching in 1795, and was married to a friend of Southey the same year. Later he published a journal, which did not prove a financial success.

Coleridge went to Germany in 1798 and took a course of study at Göttingen. After his return to England, he located at the Lakes, where he met Southey and Wordsworth. Soon after he translated Schiller's "Wallenstein," brought out lyrical ballads in connection with Southey and Wordsworth, and contributed to the *Morning Post* in literature and politics. His lectures on poetry and the fine arts at London soon followed, but they did not prove a financial success. He became troubled with neuralgia and

rheumatism and began the use of opium, by which he was enslaved into the opium habit. His power of criticism placed him in a position where he has had few equals, while many of his poems and productions in philosophy take high rank. As a critic he was among the first to bring out many of the excellent points in the writings of Shakespeare. He was the first representative of German literature and philosophy in England and, next to Carlyle, the most potent. Among his chief writings are "The Rime of the Ancient Mariner," "Christabel," "The Friend," "Juvenile Poems," "Lyrical Ballads," and "Kubla Khan."

COLERIDGE-TAYLOR, Samuel, composer of music, born in London, England, Aug. 15, 1875; died Sept. 1, 1912. He entered the Royal College of Music at the age of fifteen, and later took instruction under C. Villiers Stanford. He devoted himself entirely to composing music after 1896, and wrote for three choir festivals at Leeds and Birmingham. In 1904 he completed a musical setting for Longfellow's "Hiawatha." Among his publications are a number of cantatas and other musical productions, including "The Atonement," "Dream Lovers," and "The Blind Girl of Castel-Cuille."

COLFAX (kōl'faks), **Schuyler,** statesman, born in New York City, March 23, 1823; died in Mankato, Minn., Jan. 13, 1885. He removed with his father's family to Indiana in 1836. Five years later he was deputy county auditor under his stepfather, George W. Matthews, which position he held eight years. He published the *South Bend Free Press* for several years, and in 1845 bought it in connection with A. W. West, but changed its name to *Saint Joseph Valley Register.* In 1848 he was secretary of the Whig convention in Baltimore, which nominated Taylor for President. He was a delegate to the Whig convention in 1852 and was elected to Congress in 1854, of which he was a member until 1869. In 1863 he became speaker of the House and was twice reëlected. The Chicago convention of 1868 nominated him for Vice President of the United States, to which office he was elected with Grant as President. The later years of his life were spent in retirement from politics, but he was active as a lecturer, making several successful tours of the larger cities of the United States.

COLGATE UNIVERSITY, an institution founded at Hamilton, N. Y., in 1820. The name was changed to Madison University in 1846. Later the name was changed to Colgate University in honor of James B. Colgate, a leading dry goods merchant of New York, who made a number of large gifts to the institution. The university is now endowed with about $2,000,000. It has a faculty of forty instructors, 650 students, and a library of about 45,500 volumes.

COLIGNY (kō-lēn-yē'), **Gaspard de,** admiral and general, born at Châtillon-sur-Loing, France, Feb. 16, 1517; slain Aug. 22, 1572. He received early training for the army and served with much distinction under Francis I. in Italy. Henry II. valued his services highly, and he was made infantry colonel and admiral of France in 1552, though he did not command on the sea. He embraced the reformed faith, possessed remarkable capacity as a leader, and was prudent and brave in executing his plans. When Condé was taken prisoner at Dreux, he exhibited sufficient skill to save the Protestant army and France from being overrun by the Spaniards. In statesmanship he was as successful as in war. His sagacity secured freedom of worship for the Huguenots and surpassed the expectancy of the Guises. The latter unjustly accused him of murdering the Duke of Guise at Orleans, which led to the second war with the Huguenots. Catharine de Medici showed bad faith in the political affairs, by which the war was precipitated at an earlier date than expected. Coligny was commander in chief of the forces of Henry of Navarre, later Henry IV. Catherine took advantage of the marriage of Navarre with the sister of Charles IX., the king, after the conclusion of peace, and instigated the massacre of Saint Bartholomew. Coligny, being one of the chief victims, was murdered in his bed, and his body was afterward exposed to inhuman outrages by the mob. His name has gone down in history as that of the most respected and noblest Frenchman of the 16th century.



GASPARD DE COLIGNY.

COLIMA (kō-lē'mȧ), capital of the state of Colima, Mexico. It is located on a fertile plain and is surrounded by hills and mountains. Near it is the volcano Colima, which has an altitude of 12,743 feet. The city has railroad connections, a number of costly edifices, and a large trade in cotton and fruit. Among the chief buildings are the city hall, the state capitol, and the Hospital de San Juan. Colima was founded in 1522. Population, 1906, 22,445.

COLLEGE (kŏl'lĕj), an institution of learning which offers opportunities for study in advanced courses. The instruction is usually in the liberal arts, with a course of study, either fixed, or partly fixed and partly elective, commonly requiring four years for completion. Although there are many institutions that claim rank as colleges, the courses differ very widely. No distinct line of demarkation has yet been fixed between the requirements of a course of

study for an academy and a college, and between that of a college and a university. Besides, many of the high schools carry courses covering college branches, in some cases even ranking higher in efficiency than some of the colleges. A typical college course contains provisions for the study of English, German, Latin, Greek, and French languages, mathematics, physics, literature, moral and mental philosophy, civics, engineering, and other allied departments. At the completion of a definite course a degree may be granted, which, in most cases, is recognized by universities where students wish to pursue still more advanced work. Some American colleges have departments for professional training, especially for teaching, while some of the universities have academic or collegiate departments. The list of colleges also includes institutions for special training, as colleges of pedagogy, theology, medicine, music, agriculture, industrial arts, and others. It is thought that colleges had their origin in connection with the University of Paris, in the beginning of the 15th century.

Colleges have been established in many cities of the United States, some as private enterprises and others by State or Federal aid. In the leading towns and cities, from Maine to California and from Canada to the Gulf, there are one or more institutions doing college work. These institutions are usually open alike to both sexes, though there are some exceptions. Many have taken pride in building up extensive libraries, collecting museums, and attaching gymnasiums for the physical development of both sexes. The collegiate institutes of Canada occupy a place between the high school and the university, and pupils attending these schools are prepared for matriculation in the universities. Ontario had 42 collegiate institutes in 1906, and a proportional number is maintained in the other provinces. The name *college*, in Canada, as in England, refers more specially to the body of institutions that constitute a university. Several hundred college papers, including weeklies, monthlies, and quarterlies, fill a valuable field in cultivating an educational sentiment and in furthering knowledge, both among the students and general readers. College societies are maintained in all institutions of this character, having for their object the study of literature and other useful lines. In the larger colleges a number of these societies are supported, usually with courses of study and outlines for research fitted for the different classes of pupils, based upon age and educational attainments.

Many colleges have followed the plan now maintained by most universities in that they provide college extension work. By means of this department it has become possible for the instructors and officers to come in contact with people in adjacent cities and states, and to carry the benefits of higher study to localities remote from educational centers. Thus, a taste for higher education has been awakened in younger students, while older classes and professional and business men have remained in touch with wholesome reviews of branches, thereby enlarging and extending culture and learning. It is quite unnecessary to name the different colleges of the United States in this article. A number of leading institutions have been mentioned in special articles. It may be in place, however, to say that American colleges are so widely distributed and carry such a diversity of courses that it is possible for any person of thrift and brains to attain to educational power and usefulness. These colleges are open alike to poor and rich, while the expense of attendance has been reduced to a minimum. The annual expense of college attendance in many good institutions does not exceed $350, though some students can barely bridge over a year's work with less than $3,000. This, of course, depends upon the habits of economy, the society surrounding college life, and the institution at which an education is sought.

COLLEGE POINT, a locality in Greater New York City, in Queens County, on the south shore of Long Island Sound, about ten miles east of Central Park. It has a number of factories, which are devoted chiefly to the production of India-rubber goods. The streets are well improved and many of the edifices are costly structures. It is the residence of many New York business men.

COLLIE (kŏl'lȳ), or **Sheep Dog,** the name of several kinds of dogs employed extensively in controlling flocks of sheep or cattle. It is a hardy animal with long hair, stands about 25 inches high at the shoulders, and is noted for its intelligence. The muzzle is tapering and the appearance is somewhat foxlike, and the ears are carried flat on the side of the head. Dogs of this class can be easily trained to take a flock of sheep to pasture and drive them home safely at the appointed time. Sheep become accustomed to their dog and regard it as a friend. It is peculiar in its remembrance of places and for protecting flocks from wolves. The collie is a favorite sheep dog in Scotland and the Scotch breed is a representative of this class. Other breeds include the *Welsh*, the *Schipperke*, and the *Pomeranian*. The last mentioned is known as the *Spitz dog* and is favored as a house pet, being somewhat smaller than the Scotch collie.

COLLIER (kŏl'yĕr), **John Payne,** Shakespearean critic, born in London, England, June 11, 1789; died at Maidenhead, Sept. 17, 1883. He became a reporter at the Parliament for the London *Times* while still a boy, and later for the *Morning Chronicle*. His literary career commenced in 1820 with the publication of the "Poetical Decameron." Among his most important works published later are "Notes and Emendations on the Plays of Shakespeare," "The Rarest Book in the English Language," "History of English Dramatic Poetry to the

Time of Shakespeare," and "An Old Man's Diary Forty Years Ago."

COLLINGWOOD (kŏl'lĭng-wo͝od), a port town of Ontario, in Simcoe County, 94 miles northwest of Toronto, on the Northern Railway. It is nicely situated on Georgian Bay, Lake Ontario, and has important steamboat transportation facilities. The manufactures include flour, leather, spirituous liquors, and machinery. It has a large trade in lumber, manufactures, and merchandise. The public facilities include electric lights, several fine schools, and waterworks. **Population, 1901, 5,755; in 1911, 7,090.**

COLLINS (kŏl'lĭnz), **William,** poet, born at Chichester, England, Dec. 25, 1721; died June 12, 1759. He wrote "Oriental Eclogues," the most celebrated of his poems, while yet a school boy. His education was obtained at Oxford, and he sought to make his living as an author in London, but was financially unsuccessful, owing to poor health and irregular habits. He died unnoticed and unappreciated, though some of his productions are excellent. Among his most popular writings are "Dirge in Cymbeline," "Death of the Poet Thomson," "To Evening," and the poem beginning "How Sleep the Brave."

COLLINS, William Wilkie, novelist, born in London, England, Jan. 8, 1824; died Sept. 23, 1889. He studied at Highbury and later in Italy. Subsequently he returned to London and entered Lincoln's Inn as a student at law. His taste for literary work led him to write the biography of his father, this being his earliest production. He formed the acquaintance of Charles Dickens in 1850 and owes much to him for encouragement and assistance. He visited the United States in 1873-74, where he was shown distinguished honors. His novels are well known in Europe and America, and are popular on account of their fascinating style and beauty of the plots laid for their foundation. Among his most important works are "Household Words," "All the Year Round," "The Fall of Rome," "Hide and Seek," "The Woman in White," "The Dead Secret," "The Law and the Lady," "Evil Genius," "Alice Warlock," "The Moonstone," and "New Magdalen."

COLLODION (kŏl-lō'dĭ-ŏn), a solution prepared by mixing pyroxylin with alcohol and ether, or by treating the pyroxylin in ether and afterward adding alcohol until it is completely dissolved. The process recommended is to treat eight parts of pyroxylin by weight in 125 parts of rectified ether and then add eight parts of rectified alcohol. The product is very volatile, and on evaporating leaves a film which adheres to the surface of bodies, thus making it a convenient application to cuts and wounds in the place of sticking plaster. It is applied by brushing it alone over the edges of the incision, or by spreading it upon strips of ribbon. Collodion is used extensively in photography for preparing sensitive films, which are made by spreading a mixture of collodion and substances sensitive to light over glass plates. It is used in constructing small toy balloons, for making wood and fabrics waterproof, for coating to render pills and other medicinal preparations tasteless, and for a variety of other purposes.

COLLYER (kŏl'yĕr), **Robert,** American clergyman, born in Keighley, England, Dec. 8, 1823; died Nov. 30, 1912. His early life was spent in a factory at industrial employment. Later he became a blacksmith, pursuing private study for the Methodist ministry, and was admitted as a local preacher in 1843. A few years later he came to the United States. In 1859 he united with the Unitarian Church and engaged as pastor in Chicago. He organized the Unity Church in that city in 1860, and the following year became camp inspector for the Sanitary Commission. In 1879 he removed to New York City and became pastor of the Church of the Messiah. Besides a large number of sermons he published several books, among them "Talks to Young Men," "A Man in Earnest," "The Life that Now Is," and "The Simple Truth."



ROBERT COLLYER.

COLMAN (kōl'man), **Norman Jay,** public man, born near Richfield Springs, N. Y., May 16, 1827. He attended the public schools and in 1847 removed to Louisville, Ky., where he studied law, and afterward practiced in Saint Louis, Mo. During the Civil War he served in the Federal army as lieutenant colonel of volunteers, and in 1874 was elected Lieutenant Governor of Missouri. President Cleveland appointed him United States commissioner of agriculture in 1885, and when the Department of Agriculture was reorganized he became the first Secretary of Agriculture and a member of the presidential Cabinet. He published a number of valuable reports and public documents relating to agriculture.

COLMAR (kôl'mär), or **Kolmar,** a city of Germany, in Alsace-Lorraine, forty miles southwest of Strassburg. It is finely situated on the Lauch River, near the base of the Vosges, and is the converging center of several important railroads. The principal buildings include a college, a theater, a townhouse, and a cathedral. Among the chief manufactures are cotton goods, leather, hosiery, cutlery, ribbons, and machinery. It has a considerable trade in produce and merchandise. Colmar has electric railways, stone and asphalt paving, gas and electric lights, and a number of fine public schools. By the Peace of Ryswick, in 1697, it was ceded by Germany to

France, but was returned by the Treaty of Versailles is 1871. Population, 1915, 41,791.

COLOGNE (kō-lōn'), (German, Cöln), the capital of Rhenish Prussia, Germany, on the Rhine River. It is strongly fortified, a number of its fortifications dating from the Middle Ages, but they have been vastly improved by the construction of modern defenses. It has a number of famous churches of various styles of architecture, including the Romanesque, Gothic, and Transition. The Cathedral of Cologne (see Architecture) is the finest specimen of Gothic architecture in Europe. It was built in the reign of Charlemagne, and was burned in 1248, but was rebuilt soon after, although it was not fully completed until 1880. The cost of this magnificent structure is estimated at more than $10,000,000. The city is remarkable for its beauty and educational facilities. Its streets, public boulevards, botanical gardens, and zoölogical institutions are among the finest in Europe. The public school system and higher institutions of learning take high rank, while the public library and monuments embody much beauty and value. It is extensively connected by electric lines and railroads, and has a large interior and river navigation commerce. The manufactures embrace fabrics, clothing, musical instruments, glue, toys, tobacco, machinery, and the celebrated *eau de Cologne,* or Cologne water. It has grown with remarkable rapidity in commerce since the beginning of the 20th century. Cologne dates from an early period of European history. It was founded about 30 B. C. by the Ubii. In 870 it became a part of the German Empire, entered the league of the Hanseatic cities in 1201, and was joined to Prussia in 1801. Population, 1905, 428,722; in 1910, 516,167.

COLOMBIA (kō-lŏm'bē-ä), a republic of South America, located in the northwestern part of that continent. It is bounded on the north by the Caribbean Sea, east by Venezuela and Brazil, south by Ecuador, and west by the Pacific Ocean and the Republic of Panama. The location is between latitude 3° south and 12° 30′ north and between longitude 67° 30′ and 83° west. Choco Bay, Tumaco Bay, and Cupica Bay are the chief indentations on the Pacific Coast, while the Gulf of Darien is the principal inlet on the Caribbean Sea. The area is not definitely known, since some of the territory usually included is claimed by Peru, Ecuador, and Brazil, but it is generally given at 473,000 square miles.

DESCRIPTION. The surface may be divided into two regions, the great plains or llanos of the southeastern part and the Andean Cordilleras of the western section. A valley separates the Cordilleras from the highlands of Panama. The central range of the Cordilleras is the most elevated, including the volcanoes Tolema and Huila, the former reaching an altitude of 18,000 feet. The valley of the Magdalena River separates the central range from the eastern Cordilleras, which includes great tablelands and several mountains which are about 16,000 feet above the sea. In the eastern part is a great plain with streams tributary to the Orinoco and Amazon rivers. The coast line, including the indentations, is about 2,800 miles long, about half of which is on the Caribbean Sea.

The rivers belong to three systems of drainage, those flowing into the Pacific, those of the Caribbean Sea, and those draining by the Orinoco and Amazon into the Atlantic. Through the east central part flows the Magdalena, which traverses the country almost the entire distance from south to north and discharges into the Caribbean Sea. The Atrato flows northward near the western shore and discharges into the Gulf of Darien, while the Cauca is the chief tributary of the Magdalena. Among the principal affluents of the Amazon are the Japurá and the Uaupés, while the Meta and the Guaviare are the principal tributaries of the Orinoco.

The climate varies materially in different sections. It is hot in the valleys, especially where the mountains tower to considerable heights, and the tablelands are pleasant. Two rainy seasons occur in the mountainous parts, while the coast region has an abundance of rain at all times of the year, and the extreme southwestern part is quite dry. The thermometer frequently registers about 100 at Magdalena and in the eastern plains, but sea breezes make the climate pleasant along the Pacific.

FLORA AND FAUNA. The flora is greatly varied, ranging from the tropical plant life of the lower regions to scant vegetation of the elevated tablelands. Among the forest trees are many varieties of palms, including the lofty wax palm and the useful rubber tree. Forests of considerable density clothe the mountains up to a short distance from the timber line, which is located about 10,000 feet above the sea. The region is well grassed and produces many medicinal plants, such as the aloe and sarsaparilla. The plains in the eastern part are covered with nutritious and useful grasses.

Colombia has many wild animals, such as the tapir, jaguar, sloth, puma, and ant-eater. Several species of the red deer are abundant on the plateaus, and numerous kinds of monkeys are found widely distributed. Among the birds are the condor, toucan, vulture, and humming bird. The reptiles include serpents, turtles, and lizards.

MINING. Nearly all the precious and useful minerals abound, but mining has not been developed to a considerable extent. Gold mining is carried on chiefly in Antioquia, and silver mines are worked in Cauca and Tolima. Valuable deposits of coal occur in the eastern Cordilleras, and emeralds are found in the state of Boyaca. Salt mining is a government monopoly and is carried on chiefly in the vicinity of Nemocón and Zipaquirá, where extensive deposits of salt rock and salt springs abound.

Other minerals known to exist include lead, copper, iron, and platinum.

AGRICULTURE. Farming is the principal industry, but the methods are still primitive. It is confined largely to the elevated plateau in the western part, where the climate and soil are very favorable. Sugar cane, coffee, cacao, and tobacco are cultivated largely in the warmer districts, while corn, maize, and barley are the leading crops in the more temperate parts. Fruit is grown very extensively, especially the banana, orange, apple, and lemon. The tolu, valuable for its balsam, thrives in the uplands, and the rubber tree is native and yields large quantities of commercial rubber. All the domestic animals common to North America thrive, but cattle raising is receiving the greatest share of attention.

TRANSPORTATION. Public highways have been constructed in the settled districts, but the railroad lines do not exceed 700 miles. Many of the railways are short, ranging from 15 to 100 miles, and are operated largely as a means of connecting the streams or to penetrate a short distance inland from the coast. The Magdalena is the most important stream for inland navigation and together with the Cauca reaches the chief points of the interior. A considerable distance of the lower Atrato is navigable, and communication with the Orinoco is facilitated through the Meta River. Telephone and telegraph connections are abundant, and many steamers carry trade to the ports of Europe and North America.

MANUFACTURES AND COMMERCE. Manufacturing is confined largely to articles used in domestic consumption. They include straw mattings, cotton fabrics, pottery, and Panama hats. Sugar is manufactured to a considerable extent, and the goverment has a monopoly of the distillation of liquor from sugar. The chief exports include cattle, coffee, minerals, hides, and fruits, while the imports embrace principally flour, petroleum, ironware, drugs, chemicals, and machinery. Trade with the leading nations in the order named is with the United States, Great Britain, Germany, and France. The imports slightly exceed the exports.

GOVERNMENT. The government is constitutional, with the chief administrative power vested in a president chosen for six years by an electoral college. A ministry of six members assists the president, and there is a council of state of six members. The congress has full legislative power, and consists of a senate and a house of representatives; the former, of 24 senators, three from each of the eight departments, and the latter, of 66 representatives. A supreme court of seven judges, nominated by the president and confirmed by the senate, has the highest administration of justice, and subject to it are the supreme and provincial courts. Each of the states has a governor and is divided into smaller districts corresponding to a county in Canada or the United States. The army and navy are made up of all able-bodied citizens, but the peace organization embraces only about 1,500 men.

INHABITANTS. Colombia is inhabited by a people of Spanish descent. Roman Catholic is the official religion, but other denominations have been granted freedom in building churches and conducting public worship. The educational interests have been developed by a system of common schools supported by the government. Elementary education is free, but not compulsory, and many private and parochial schools are maintained. Among the special and higher institutions are several normal schools, an agricultural college, four general colleges, and a national university. Spanish is the spoken and written language. Bogotá, in the west central part, is the capital and largest city. Barranquilla and Cartagena, both on the Carribean Sea, and Buenaventura, on the Pacific, are the principal seaports. Magdalena, on the Magdalena River, is important as a river port and has connection by railway with Cartagena. Other cities of importance include Medellin, Papayan, Sonsón, and Socorro. Population, 1917, 5,279,674.

HISTORY. The country now forming most of Colombia was formerly called New Granada. It was discovered in 1499 by Alonzo de Ojeda and was visited by Columbus in 1502, while he was on his fourth voyage to America. The first settlement was made by the Spanish at Santa Maria, in the Gulf of Darien, in 1510, and the whole region was organized as a province in 1547 under a captain general. In 1811 New Granada declared its independence from Spain and effected its liberation with the help of Venezuela, after a war lasting eleven years. The two states united with Ecuador under the name of Colombia, but separated in 1831 into three independent republics. New Granada adopted a constitution in 1863 and became known as the United States of Colombia. In 1884 the country was suddenly thrown into a revolution, which was terminated in 1886 and a new constitution was adopted, which gave the country a more strongly centralized government. Another revolution occurred in 1903, when Panama broke away from the mother country and organized as an independent republic. Since then the country has had an era of peace and is making material strides in constructing internal improvements and enlarging its influence among the states of South America.

COLOMBO (kŏ-lŏm′bō), a seaport city and the capital of Ceylon. It is an important center for railway and navigation commerce. Among the public buildings are a museum, the government house, the supreme court, and several educational buildings. The post office and the palace of the governor are on Queen Street, which is the principal thoroughfare. A large majority of the houses are of one story, each having a veranda in front, and few are furnished by

LIBRARY
UNIVERSITY OF ILLINOIS

doors and windows. The harbor affords vast accommodations and has been improved by an extensive breakwater. Electric lights, street railways, and other municipal facilities have been provided. The city was founded by the Portuguese and was captured by the British in 1796. Population, 1916, 221,508.

COLÓN (kō-lōn′), or **Aspinwall,** a seaport in the republic of Panama, important on account of its location on the Caribbean Sea, forty-nine miles northwest of the city of Panama. It is situated at the northern terminus of the Isthmian Railway, near the Atlantic extremity of the Panama Canal, and has a deep harbor on Navy Bay. The site is low and somewhat unhealthful, but has been improved materially by constructive work of the United States in the Panama Canal zone. The streets are wide and regularly platted and are improved by grading and drainage. Among the chief buildings are a number of schools and churches, several fine business establishments, and the structures erected by the government. Colón was first named Aspinwall from its founder, who built the Isthmian Railway, but it is officially known as Colón, so named in honor of Columbus. A fine statue of Columbus was erected in one of its public places in 1883. Population, 1918, 24,825.

COLONNA (kō-lŏn′nà), **Cape,** the most southerly point of Attica, Greece. The ruins of the celebrated temple of Minerva, of which sixteen columns of white marble remain, are on its highest elevation, 270 feet above the sea.

COLONNA, Victoria, poetess, born at Marino, Italy, in 1490; died in Rome, Feb. 25, 1547. She was the daughter of Fabrizio Colonna, high constable of Naples, and married at the age of seventeen years to Ferdinand, Marquis of Pescara. Her husband was slain in the Battle of Pavia in 1525, after which she cultivated her poetical genius, and devoted her poetry to the memory of her husband. The most noted of her productions is "Rime Spirituali," remarkable for its sentiment of truth and piety.

COLONY (kŏl′ō-nў), a company of people who associate together for mutual advantage in the settlement of a remote country. The colonists usually have a common object and unite on account of similar social interests, or religious or political views. They may migrate from different countries, or from a single country. This mode of settlement is called *colonization,* and is due largely to the over-population or the suppression of certain liberties in the mother country. The name *colony* is commonly applied to a foreign dependency of a state or country. These dependencies are secured in various ways, often by settlement of large numbers, by purchase, or by wars of conquest. The tendency of Germany for many centuries was to direct emigration to various favorable regions for commercial enterprises, personal development, or religious liberty without seeking to profit by foreign possessions. Great Britain adopted a policy of colonization, directing emigration thither, and later sought to secure control by diplomacy or war. Spain and various other nations sent armies abroad largely for conquest by the sword, though many settlements were made under their direction similar to those of Germany and England.

ANCIENT COLONIES. The Phoenicians, the Greeks, and the Romans were the principal promoters of colonization among the ancient nations of which we have an authentic history. The Phoenicians, though a small people, founded a majority of the most powerful colonies of antiquity. Isaiah called Tyre the daughter of Sidon, meaning that Tyre was originally a Sidonian colony. Later Tyre founded important colonies, such as Carthage in Northern Africa and Cadiz in Spain. Colonies were sent from almost every Greek state. They settled the whole of West Asia Minor, the islands of the Mediterranean Sea, and southern Italy, and extended into southern France. The colonies of the Phoenicians and Greeks were small states with a form of government which was almost entirely independent of the mother country, while Rome made her colonies subject to the parent government. The Roman colonies were of two classes, civil and military. Coins issued for the former contained a plow, while those of the latter were decorated with warlike designs. The Roman colonies extended over a vast area of Eurasia and Africa. Where they became sufficiently strong, the languages of the native races were modified or displaced by the Latin, the effect of which is seen in the modern French, Spanish, Italian, and Portuguese. The present languages of these peoples are modifications of the old Roman tongue and bear much similarity to the Roman.

PORTUGUESE AND SPANISH COLONIES. The Portuguese rank as the first great colonizers of modern times. They descovered Madeira in 1419, and shortly after followed the discovery of the Azores, the Cape Verde Islands, the Congo River, the Cape of Good Hope, and the Malabar coast of India. Later they established trading posts at Mozambique and Sofala in Southeastern Africa, at Muscat and Ormuz on the Persian Gulf, on the western coast of India, and at Goa and Daman. Their colonies in Ceylon were established in 1505, and were followed by settlements in the Moluccas, Brazil, India, and other localities. The foreign possessions of Portugal now include the Cape Verde and other islands, and several districts in Africa and Australasia. The Spanish colonization policy was one of the most extensive in the world. Columbus sailed under the Spanish flag in 1492 and discovered the island of San Salvador. His subsequent discoveries and those of other Spaniards caused Spain to occupy all of South America, except Brazil. The Spaniards also occupied Central America, Mexico, the East Indies, the Philippine Islands, large portions of the territory now

included in the United States, and many other regions. However, the Spanish colonies have dwindled down to insignificance, owing to continued wars and dissensions.

DUTCH AND DANISH COLONIES. The Dutch were among the greatest colonizers. In 1620 several companies were formed to monopolize trade in the East Indies, at the Cape of Good Hope, in South America, in continental Asia, Australia, and many islands of the sea. Wars with France, Spain, and England caused a loss of many Dutch possessions. Their foothold in New York was absorbed early by the English, and later various other possessions passed from their control. The most important possessions now controlled by them are in the East Indies. Denmark has long pursued a policy of colonization. The dependencies of this nation are of considerable extent, but of small value. They include the Faroe Islands, Iceland, Greenland, a number of islands of the East Indies purchased of France in 1733, and several others colonized by them.

FRENCH COLONIES. France has long ranked as a colonial power. Citizens of France began colonizing in 1627 in various portions of the world. The most valuable parts of North America were once under the dominion of the French, and they likewise possessed vast colonies in Asia and numerous island archipelagoes. Their northern possessions in North America were lost in several wars with the British, while the western portions were sold by Napoleon in 1803 to the United States. The chief colonies of France at present include those in India, Tonquin, Anam, and Cochin China in Southeastern Asia; Tunis, Algeria, Madagascar, Guiana, and various islands, the whole constituting a large area of valuable regions.

BRITISH COLONIES. England began colonization in 1585 by encouraging settlements in North America, but made little success until 1607, when the first permanent settlement was made at Jamestown. Later, territories were acquired in Asia, Australia, Africa, and many islands of the sea. The principal possessions of the British now include Australia, British America, South Africa, most of India, Belize, Guiana, Ceylon, New Zealand, Tasmania, and various islands in different parts of the oceans and seas. The British possessions and dependencies embrace nearly one-sixth of the land surface of the earth and fully one-seventh of mankind.

GERMAN AND OTHER COLONIES. Germany has mainly directed its emigration to foreign countries without attempting to secure permanent foothold until within recent years. Its colonies at the present time are of considerable extent. The principal German possessions include a portion of New Guinea, the Bismarck Archipelago, Cameroon, Togoland, German East Africa, German Southwest Africa, the Caroline Islands, Kiauchau, in China, and a number of islands. Various other European powers have a foreign colonial policy, especially Italy and Russia. The latter country is operating more particularly in the northern and western regions of Asia, and is endeavoring to control the larger portion of that continent, making its possessions largely contiguous to its home central government. The United States entered upon a colonial policy in 1898 by the annexation of the Hawaiian Islands. After the war with Spain, in 1898, Porto Rico, Guam, and other islands were annexed. The Philippine Islands are the largest colonial possessions of the United States.

The experience of past ages demonstrates clearly that the possession of foreign territory does not add to the stability of a nation. Hostilities generally growing out of the purchase or conquest of a region which is populated by an unfriendly people require a vast navy and a large colonial army even in the time of peace, while racial and commercial complications may be the causes of insurrections at any time. The colonial policy of Spain, though continuing for over 300 years, ultimately almost bankrupted the nation, while Great Britain, because of her vast colonial interests, has need for large naval and military forces. Aside from spreading particular religious beliefs and languages, no permanent advantages have accrued to the nations having colonial policies, while many have been materially weakened at home and even brought to a condition of retrogression. Colonization has given to Brazil the Portuguese language, and to all the rest of South America, Central America, and Mexico the Spanish, while all these vast regions have become Roman Catholic in religion. The English language has been carried to the United States, British America, Australia, and other regions in the same way.

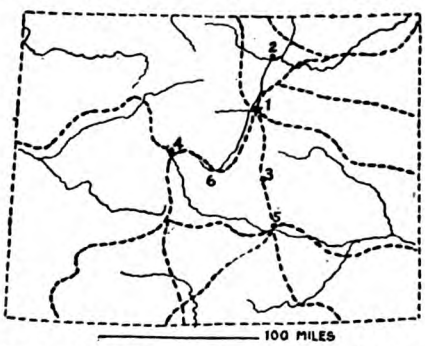
COLOPHON (kŏl'o-phon), one of the twelve Ionian cities on the coast of Asia Minor, located eight miles north of Ephesus, on the Halesus River. It was celebrated for its navy and cavalry, and was one of the seven cities that claimed to be the birthplace of Homer.

COLOR (kŭl'ẽr), that quality of bodies by which they present different appearances in respect to hue or tint to the eye. In optics, color is studied chiefly in connection with the *solar spectrum*, which is the spectrum of solar light. The white lines that reach us from the sun disperse or decompose into several colors when passed from one medium into another. The solar beam may be developed into seven colors by means of a prism. They are red, orange, yellow, green, blue, indigo, and violet. Red, violet-blue, and yellow are considered *fundamental* colors. Sir Isaac Newton was the first to decompose white light by a prism and then recompose it. According to his theory, bodies decompose light only by reflection, their colors depending upon their reflecting power for the different simple colors. Bodies that reflect all colors in proportions as they exist in the spectrum are

white, those that reflect none are black. A wide diversity of colors exists between these two limits, this being dependent upon the extent to which bodies absorb some colors and reflect others. According to this hypothesis, it is presumed that bodies have no colors in themselves, but produce them by the kind of light which they reflect. When white light falls on a green leaf, all the colors but green are absorbed, and, this given off, makes the leaf appear green, A red cloth in the same way absorbs all colors but red, and therefore appears red. Thus, the different color effects of the beam of light depend upon the qualities of the substances on which they fall.

The rainbow is formed by drops of falling rain, through which light passes, and is separated into its prismatic colors, all the colors of the solar spectrum. Plant tissues are largely colorless, a silvery white, or a pale yellow. The green color taken on subsequently is due to the action of the solar light, which produces *chlorophyll*, the name applied to the green coloring matter of plants. The pigments or colors used by painters are distinguished from the colors of the solar spectrum. In the arts the pigments blue, red, and yellow are the *primary* hues and may be made to form any other colors, but they cannot be formed by any others. The national colors of the United States are blue, white, and red; of Germany, black, white, and red; of Russia, white, blue, and red; of Great Britain, red and blue; of Australia, red, white, and green; of France, blue, white, and red; of Spain, yellow and red; of Sweden, blue and yellow; of Denmark, red and white; of Switzerland, red and white.

COLORADO (kŏl-ō-rä′dō), a western State of the United States, located in the center of the portion of the United States lying west



1, Denver; 2, Greeley; 3, Colorado Springs; 4, Leadville; 5, Pueblo; 6, Pike's Peak. Chief railroads shown by dotted lines.

of the Mississippi River. It is bounded on the north by Wyoming and Nebraska, east by Nebraska and Kansas, south by Oklahoma and New Mexico, and west by Utah. The State is quadrilateral in shape and is bounded by the parallels 37° and 41° north and the meridians 102° and 109° west from Greenwich. It is about 370 miles long and 280 miles wide, and has an area of 103,925 square miles.

DESCRIPTION. The continental range of the Rocky Mountains extends across the State from north to south, near its center. Pike's Peak, west of Colorado Springs, is the most famous summit in the State, but not the highest, being one of many that have an elevation of 14,000 to 14,500 feet. In the western section are three more or less prominent ranges, including the White River Mountains in the west, the Park and Saguache somewhat farther east, and the Front Range near the Saguache. Among the mountains are numerous plateaus known as parks, of which the surface is quite fertile and the climate is healthful. Two natural divisions characterize the general surface of the State, those embraced in the mountains and the plains, the former having an elevation of 5,000 to 14,500 feet, while the latter is located from 4,000 to 5,000 feet above the sea. In many places the scenery is beautiful and grand, especially in the localities known as Monument Park and the Garden of the Gods.

The western part of Colorado is crossed from north to south by the great continental divide. On the eastern slope, flowing toward the Mississippi, are the South Platte and Arkansas rivers. The Rio Grande drains the San Luis Valley, while the Grand flows toward the southwest. The Yampa and White are tributaries of the Green, which unites with the Grand in eastern Utah and forms the Colorado River. None of these rivers is navigable, but they with their numerous branches furnish a supply of water for irrigation purposes. A large number of the streams flow through canyons which are noted for their grandeur, and in many places are cold and thermal springs with distinctive medicinal properties. The most noted springs are located at Manitou, Cañon City, Idaho Springs, Glenwood Springs, Hot Sulphur Springs, Steamboat Springs, and Pagosa Springs.

The climate is delightful, the air is dry, and the sunshine is abundant. Rains fall throughout the warm parts of the year and snows occur in winter, but both are moderate in quantity. The altitude and dryness minimize the heat in summer and the cold in winter. The perpetual snow line varies between 13,000 and 14,000 feet, except on the side of the mountains sloping toward the north and in deep canyons, where it is considerably lower. Colorado has a mean annual rainfall of 14.8 inches, and it is distributed quite generally throughout the State, though it is heaviest in the mountains. In summer time the days are frequently quite hot, but the nights are cool and bracing. At Denver the mean temperature in January is 28.2° and in July, 71.8°.

MINING. Colorado leads in the production of the precious and allied metals all other states in the Union, producing twice as much gold and silver as any other State and more than one-fourth of the total output of the United States.

It has extensive coal resources, both bituminous and anthracite, and in the output exceeds all the states west of Illinois and is seventh in rank among the coal-producing states, being surpassed only by Pennsylvania, Illinois, West Virginia, Ohio, Alabama, and Indiana, in the order named. It ranks second among the states in the output of anthracite, being exceeded only by Pennsylvania. The coal fields are situated on both sides of the Rocky Mountains, those on the western slope being the largest and most important in quantity and quality. Other minerals found extensively include lead, iron, copper, zinc, gypsum, petroleum, onyx, and kaolin. Cripple Creek, Leadville, Colorado Springs, Pueblo, Silverton, Creede, and Telluride are located in the vicinity of productive mining districts.

AGRICULTURE. Colorado was formerly regarded unsuitable for agriculture, owing to its aridity and elevation, but irrigation has been a potent influence in developing its resources. The rainfall is sufficiently large in some parts of the State in particularly favorable seasons, especially to induce the vigorous growth of native grasses, and wherever water is available the investments in farming are very profitable. The main canals and ditches constructed for irrigation have a total length of about 12,000 miles and the farms average 384 acres, which is much larger than the size of the average farm in the United States, due chiefly to the number of holdings used for stock grazing. Alfalfa is grown very extensively for fodder and yields from one to three cuttings per year. The culture of sugar beets has grown extensively the last decade, and the output is valued at about $25,500,000 annually. Other crops grown extensively are cereals, fruits, potatoes and vegetables.

The State is favored with the growth of many nutritious grasses suitable for grazing, and stock raising was an important industry before general farming was attempted. Large herds of cattle are grown for meat and dairy products, both of which form important items in the business enterprises. Sheep raising is possible in all sections, but the largest flocks are in the southern counties. Swine are not raised as extensively as in the states of the Mississippi Valley, owing to the fact that corn is grown on a comparatively smaller area, but horses and mules are reared in large numbers.

TRANSPORTATION AND COMMERCE. None of the rivers is navigable, but the State has many lines of railroads, aggregating about 6,250 miles, and they are well distributed in all sections. The lines include a number of the trunk railways which connect the commercial centers of the State with the business emporiums of the Mississippi Valley and the Pacific Coast, including many branch lines that penetrate in all directions, affording unexcelled highways of commerce. Denver is noted as a market and wholesaling and jobbing center.

MANUFACTURING. The great variety of raw materials give Colorado advantages as a manufacturing State. Among the leading industrial establishments are the iron and steel works at Pueblo and the foundries and machine shops at Denver. Coke is manufactured extensively, the State ranking fourth in the quantity of this product. A fine quality of brick clay is abundant in many localities, especially in the vicinity of Denver, where the brick plants have a large output. Other industrial enterprises include flouring and grist mills, canning factories, creameries and cheese factories, printing and publishing plants, beet sugar factories, and gold, silver, copper, and lead smelting works. Sawmills are located in many places for cutting fir, pine, and spruce forests, which cover a large area in the mountains below the snow line.

EDUCATION. Ample provisions have been made for the education of the youth. The State has a permanent school fund obtained from the sale and rent of about 3,550,000 acres of school land, and the income is apportioned among the schools of the State. The University of Colorado is located at Boulder; the State School of Mines, at Golden; the State Agricultural College, at Fort Collins; the State Normal School, at Greeley; the Mute and Blind Institute, at Colorado Springs; and the Industrial School, at Golden. Many private and denominational schools and institutions of higher learning are maintained, including Denver University, Denver, and Colorado College, Colorado Springs.

GOVERNMENT. The constitution was adopted by a vote of the people in 1876, when the State was admitted, but it has been amended several times. It requires a residence of six months as a prerequisite to vote and extends the right of suffrage to both sexes at school elections, and in addition provides that the Legislature may extend the right of suffrage to women, but such an act must be approved by a vote of the people. Executive authority is vested in the governor, lieutenant governor, secretary, treasurer, auditor, attorney-general, and superintendent of public instruction, each being elected for two years. The legislative functions are vested in the Legislature, which consists of the Senate and the House of Representatives. Senators are elected for four and representatives for two years. The aggregate membership in both houses cannot exceed 100. At present there are thirty-five senators and sixty-five representatives. The judicial power is vested in a supreme court, the district and county courts, justices of the peace, and such other courts as may be provided by law. Local government is administered by counties, townships, and municipalities.

INHABITANTS. Colorado has a larger population than any of the Rocky Mountain states. About one-fifth are of foreign birth, and fully forty per cent. reside in the cities with a population of over 4,000. Denver, the capital, is the largest city and chief commercial center. Other

flourishing cities include Pueblo, Colorado Springs, Leadville, Cripple Creek, Boulder, Trinidad, Salida, and Rockyford. The State has had a steady growth in population, which, in 1900, was 539,700; in 1910, 799,024.

HISTORY. Colorado was acquired in three sections. About one-half was acquired from France by the Louisiana Purchase in 1803; a portion of the west and north, by the Mexican Cession of 1848; and the remainder, by purchase from Texas in 1850. Coronado visited the region in 1541. He is supposed to have been the first white man to set foot within the present limits of the State, which received its name from him. Zebulon Pike explored the region under the authority of the government in 1806. The next expedition was undertaken in 1819 by Stephen S. Long, and John C. Frémont began a series of five explorations in search of practical railway routes in 1842. Immigration was attracted by the discovery of gold in 1858, at which time the parks were inhabited by the Ute Indians and the plains were occupied by the Cheyennes, Arapahoes, Kiowas, and Comanches. In 1861 it was organized as a Territory and was admitted as a State in 1876, hence is popularly known as the *Centennial State*. In 1893 the State adopted woman suffrage at a special election by a majority of about 4,500 votes. The capitol building, which cost about $2,500,000, was completed at Denver in 1894.

COLORADO, University of, an educational institution at Boulder, Colo. It was incorporated by the territorial Legislature in 1861, and became the State university by the provisions of the constitution of Colorado in 1876. When it was opened formally, in 1877, it embraced a preparatory department and the college proper, to which were added the medical school in 1883, the law school in 1892, and the school of applied sciences in 1893. At present it embraces five departments, including the college of liberal arts, the graduate department, the school of law, the school of applied science, and the medical school. It is maintained by a direct tax upon the properties of the State and is governed by a board of regents. The library contains about 80,000 volumes. The faculty consists of two hundred professors and instructors and the average annual registration of students is about 2,000.

COLORADO BEETLE, better known as potato bug, an American beetle first described by Thomas Say in 1824 from specimens found by him in Missouri. It was first noticed as a pest in the potato fields of Colorado, hence its name. Subsequently it moved eastward rapidly, and reached the Atlantic coast in 1874. It is of a yellowish color, with black stripes along the back. The young are reddish, fleshy, and soft, and do most of the damage to the growing plants.

COLORADO RIVER, a river of Texas, rises near the southeastern boundary of New Mexico, and discharges into the Gulf of Mexico through Matagorda Bay. The Llano, San Saba, and Concho are its chief tributaries. Among the chief cities located on its banks are Austin, Bastrop, Bay City, Lagrange, and Wharton. It is navigable for small boats to Austin, a distance of about 200 miles, and the total length is about 900 miles.



COLORADO BEETLE.

A, Eggs; *B*, Larvae; *C*, Pupa; *D*, Adults; *E*, Wing (magnified); *F*, Leg (magnified).

COLORADO RIVER, a large river of the United States, formed in the southeastern part of Utah by the junction of the Green and Grand rivers. It flows south and west in Utah, passes through the northwestern part of Arizona, and forms the boundary between Arizona on the east and Nevada and California on the west. Near its mouth it passes into Mexico and discharges into the Gulf of California. The length of the Colorado River proper is 900 miles, but with the Green, its largest confluent, it has a course of nearly 2,000 miles. It is remarkable for its great canyons, the principal one being the Grand Canyon. This natural phenomenon is about 300 miles long, with perpendicular walls at some places fully 6,000 feet above the water. In the northern part of Arizona the Grand Canyon is five to six miles wide at the top and 6,000 feet deep, narrowing by successive depressions until the narrow and gloomy gorge in which the river flows is reached, where the descent is almost perpendicular to depths varying from 2,000 to 3,000 feet. Among the chief tributaries are the San Juan in Utah, the Little Colorado and the Gila in Arizona, and the Virgin in Nevada.

COLORADO SPRINGS, a city in Colorado, county seat of El Paso County, sixty-five miles south of Denver, on the Denver and Rio Grande, the Santa Fé, and other railroads. It is the seat of Colorado College, an institution which carries full college courses. This institution has a library of 35,000 volumes, a faculty of forty instructors, and about 675 students. Ten miles from the city is Pike's Peak, which lifts its snowy summits in great beauty and may be reached by several railways. Manitou is a health resort six miles from the city, at the foot of Pike's Peak, and between the two cities is the wonderful Garden of the Gods. Fine natural and artificial scenery make the city one of the most delightful in the west. It has good schools, a fine trade, and numerous industries. Gas and









Method

The original design is photographed through color screens which disect the three primary colors and their combinations as they appear in the original

The negative for the yellow printing plate is photographed through a purple color screen, which absorbs the red and blue color rays, giving only the yellow color values upon the sensitive plate or negative

The negative for the red printing plate is made through a green color screen, which absorbs the yellow and blue color rays, giving only the red color values

The negative for the blue printing plate is made through an orange color screen, which absorbs the yellow and red color rays, giving only the blue color values of the original

From these disected color negatives a print etched on copper is made, mounted on wood, and is then ready for the printing press. These three cuts are then printed on an ordinary type press in their respective colors, first yellow, then red and finally blue, with the result that the effect will be an exact reproduction of the original copy

(Opp. 633)

COLOR PRINTING.

Proof of yellow printing plate.

Proof of yellow and red combined.

Completed picture printed in yellow, red and blue.

Proof of red printing plate.

Proof of blue printing plate.

Explanation of the method.

electric lights, pavements, waterworks, and rapid transit are among its improvements. It was settled in 1870 and incorporated in 1872. Population, 1900, 21,085; in 1910, 29,078.

COLOR BLINDNESS, or **Daltonism,** a term used to describe a defect of vision, which is not usually accompanied by any other imperfection of the eye. It is incurable and peculiarly affects families, being transmitted from parents to child. The eye in a normal condition has three primary sensations, those of green, red, and violet, and color impressions are formed by the combinations of these. Color blindness is due to the absence of one of the primary sensations, usually the red or green, and very rarely the violet. About one per cent. of women and from three to four per cent. of men have a color blind vision. It is due to a defective retina or the admission of an insufficient amount of light. The latter is noticeable when examining any objects that are more or less colored by artificial light, since it is impossible to distinguish colors properly at night, except the shades of white and black. Color blindness is frequently acquired by the excessive use of tobacco and by children being confined in schoolrooms that are not sufficiently lighted. It may be detected by a selection of colored worsteds, a test devised by Prof. Holmgren of Upsala. In many countries a strict examination is required for those who are employed in the railway service, especially in the departments where color signals are used.

COLOR PRINTING, the art of producing several colors in printing. The process formerly required as many impressions as colors desired in the finished product. A card or chromo in which ten colors were desired required passing through printing presses ten different times, once for each color to be applied. Now color printing is done largely by three impressions. The principle involved is that if a photograph be taken in three colors of nature—red, blue, and green—and plates be made from each photograph by a photomechanical process, impressions of the plate may be taken in their appropriate colors, thus producing a combination which involves the colors of the original, even showing blendings much as are seen in nature.

COLOSSEUM (kŏl-ŏs-sē′ŭm), the name applied to the greatest of Roman amphitheaters. It was built in the form of an ellipse, the length being 612 feet and the breadth 515 feet. It was begun by Vespasian and was finished by Titus in the year 80 A. D. The base covered five acres, and there was a seating capacity for about 87,000 people. It ranked as the largest and most important inclosure for the celebration of the national games, and its ruins are still among the interesting relics of antiquity. Titus dedicated it by games lasting a hundred days, in which 5,000 wild animals were slain. It was surrounded by a row of pilasters, contained eighty openings on the ground story, over which were constructed three other stories, the whole rising to a height of 160 feet. Open galleries were constructed throughout the whole building, passing beneath the columns. The interior space was covered with sawdust or sand, in which the games were exhibited in the presence of vast multitudes occupying the seats in the different



COLOSSEUM AT ROME.

stories, arranged in circular order. These games were visited by the emperor, senators, and the populace, forming the most interesting of public demonstrations.

COLOSSUS (kŏ-lŏs′sŭs), a term applied generally to statues of great size built by the people of antiquity. The most important statue of this class built by the Grecians was the *Colossus at Rhodes,* being a brass statue of Helios, the sun god, which came to be counted among the wonders of the world. It was constructed from the spoils left by Demetrius Poliorcetes when he raised the siege of Rhodes. The work was done under the sculptor Chares of Lindus, who spent twelve years in finishing the work, completing it in 280 B. C. An earthquake threw it down about 224 B. C. The statue is said to have stood upon two moles, a leg being extended on each side of the harbor so that a vessel in full sail could enter between. Some writers assume its height to have been from 100 to 125 feet. It was in ruins for nearly nine centuries, and when the Saracens captured Rhodes they pulled it to pieces and sold it to a Jew. The Jew transported it to Alexandria about 653 A. D., requiring 900 camels to effect the transportation. A number of modern memorials are known by the general name of Colossus from their enormous size, such as the *Bavaria* at Munich, the *Germania* at Niedervald, on the Rhine, and the statue of *Liberty Enlightening the World,* in New York Harbor.

COLT (kōlt), **Samuel,** inventor, born at Hartford, Conn., July 19, 1814; died Jan. 10, 1862. He was the son of a manufacturer of silk and woolen goods, made a voyage to India, and subsequently invented the Colt revolver. In 1835 he visited Europe and patented his invention at Paris and London, but did not succeed in its manufacture until the government of the United States placed an order with him for 1,000 to be used in the Mexican War. He built extensive shops at Hartford, Conn., enlarged them in 1852, and built an enormous factory on the banks

of the Connecticut River in 1861. His product was sold in Russia and other European countries in large quantities. See **Revolver.**

COLTSFOOT (kōlts'fo͝ot), a genus of plants native to Europe and naturalized more or less extensively in America. The common coltsfoot is a weed and is so named from the broad and heart-shaped leaves, which resemble the foot of a colt. It has yellow flowers. The leaves are somewhat glutinous and the lower side is downy. Bees seek the flowers for honey.

COLUMBA (kŏ-lŭm'bà), **Saint,** missionary, born at Gartan, Ireland, Dec. 7, 521; died June 9, 597. He was related to a number of rulers of Ireland and Scotland, studied at Moville, near Bangor, and was ordained deacon by Bishop Saint Finnian. In 545 he founded the church and monastery at Derry, which grew rapidly under his monastic zeal, and in 553 he established the monastery of Durrow, near Dublin. He became embroiled in the civil strife of Ireland and was excommunicated in 563 by an Irish senate on a charge of having incited the Battle of Culdreimhne. The same year he organized a company of twelve disciples and founded in Iona, one of the Hebrides, a church and monastery for the purpose of converting the Picts. He succeeded in overcoming the opposition of the Druids and was successful in promoting monasticism among them.

COLUMBIA (kŏ-lŭm'bĭ-à). See **District of Columbia.**

COLUMBIA, county seat of Boone County, Missouri, 114 miles northwest of Saint Louis, on the Wabash and the Missouri, Kansas and Texas railroads. It is the seat of the Missouri State University, Christian College, Stephens Baptist College for Women, and the State College of Agriculture. Besides doing a good jobbing trade, it manufactures flour, woolen goods, tobacco, and spirituous liquors. It has a system of waterworks and a monument to Thomas Jefferson. The first settlement in the vicinity was made in 1820. Population, 1910, 9,662.

COLUMBIA, county seat of Maury County, Tennessee, on the Duck River, forty-five miles south of Nashville. It is on the Louisville and Nashville and other railroads, and is surrounded by a fertile farming country. Phosphate is produced in the vicinity. The chief buildings include the courthouse, Jackson College, two seminaries, and a United States arsenal. Flouring mills, grain elevators, and cotton mills are among its industries. The city has electric lights, waterworks, and a sewerage system. It was settled in 1811 and incorporated in 1822. Population, 1900, 6,052; in 1910, 5,754.

COLUMBIA, a borough of Pennsylvania, in Lancaster County, on the Susquehanna River, eighty miles west of Philadelphia. It is on the Pennsylvania and the Philadelphia and Reading railroads. On the opposite side of the river is Wrightsville, with which it is connected by a bridge about a mile in length. It has a large trade in merchandise. The chief industries include cotton, flouring, and planing mills, iron foundries, stove works, and shops for the production of implements, railroad iron, and steam engines. Among the public utilities are waterworks, stone and macadam pavements, and electric street railways. Columbia was founded by the Quakers in 1726, when it was known as Wright's Ferry. Population, 1910, 11,454.

COLUMBIA, the capital of South Carolina, in Richland County, on the Congaree River, 128 miles northwest of Charleston. It is on the Seaboard Air Line, the Atlantic Coast Line, and the Southern railroads, and has transportation facilities by the Congaree River and the Columbia Canal. The site is on a beautiful plateau, about 200 feet above the river, and affords an excellent view of the surrounding country. The city has broad streets, many of which are macadamized and paved, and the residential sections are beautified by parkings and avenues of trees. The State capitol is a fine structure of granite, erected at a cost of $3,000,000. Other noteworthy buildings include the Federal courthouse and post office, the city hall, and a number of excellent public schools and churches. It is the seat of the South Carolina University, which was organized as a college in 1806 and changed to a university in 1880. Other institutions of learning include the Ursuline Convent, the Presbyterian Theological Seminary, and the Winthrop Normal College. The State University has a library of 40,000 volumes, besides which other libraries are maintained. Among the industries are commerce and the manufacture of cotton goods, tobacco products, machinery and furniture. It has extensive systems of waterworks, sewerage, and electric street railways. Columbia was settled in 1700 and became the State capital in 1786. General Sherman captured it in 1865, when a large part of the city was destroyed by fire. Population, 1910, 26,319.

COLUMBIAN UNIVERSITY, a coeducational institution located at Washington, D. C., maintained by the Baptists. It was organized in 1821 as Columbian College, when it comprised courses in theology, medicine, and the classics, and it was reorganized under its present name in 1873. At present it embraces the Corcoran Scientific School, Columbian College, the law school, the medical and dental schools, the school of jurisprudence and diplomacy, and the school of graduate studies. It has a library of 25,000 volumes, a faculty of 185 instructors, and an attendance of about 1,500 students.

COLUMBIA RIVER, an important river of North America, rises in British Columbia, flows through Washington, forms the boundary between Washington and Oregon, and discharges into the Pacific Ocean. The total length is 1,350 miles. Its principal tributaries include the Willamette, Deschutes, Snake, Spokane, and Okanogan rivers. More than 650 miles are navigable. It contains a number of magnificent falls

and rapids, and is valuable for its abundance of salmon fisheries. The scenery along its lower course is grand and in many respects surpasses that of the Hudson.

COLUMBIA UNIVERSITY, an educational institution in New York City, on Morningside Heights. It was chartered by George II. as King's College in 1754, but the name was changed to Columbia College after the Revolutionary War, in 1784. In 1896 the name was changed to Columbia University, which designates the entire institution, while the name Columbia College is restricted to the undergraduate department. At present it comprises Columbia College, Barnard College, the school of law, the college of physicians and surgeons, the school of political science and philosophy, the school of applied science, the school of fine arts, the Teachers' College, and the summer school. It has endowments of $20,000,000, an annual income of $880,000, a library of 550,000 volumes, a faculty of 975 instructors, and about 8,525 students. About 35,500 persons have graduated from its courses. Its courses are extensive, ranking among the most thorough in America.

COLUMBUS (kŏ-lŭm'bŭs), county seat of Bartholomew County, Indiana, on the east fork of the White River, about forty-one miles southeast of Indianapolis. It is on the Pennsylvania and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. It is surrounded by an agricultural country, and has large flouring mills, machine shops, and implement and furniture factories. Among the public utilities are waterworks, sewerage, and electric street railways. It has a brisk trade in merchandise and farm produce. Population, 1910, 8,813.

COLUMBUS, a city in Georgia, county seat of Muscogee County, on the Chattahoochee River and on the Southern, the Seaboard Air Line, and the Central of Georgia railroads. It is located about 300 miles from the Gulf of Mexico, with which it has steam navigation connections. The water power of the river is unlimited, and is utilized largely in manufacturing. The manufactures include hardware, textiles, machinery, cigars, clothing, and furniture. Its cotton and woolen mills are among the largest in the South and produce vast quantities of ginghams and colored goods. Besides an extensive public school system, the city contains a male academy, a female academy, and several public buildings and churches. The streets are broad and improved by pavements and avenues of trees. It has gas and electric lights, street railways, waterworks, pavements, sewerage, and a public library. Columbus was platted in 1828 and incorporated in 1829. Population, 1900, 17,614; in 1910, 20,554.

COLUMBUS, the capital of Ohio, county seat of Franklin County, on the Scioto River, 100 miles northeast of Cincinnati. It occupies a fine site near the geographical center of the State, on the Baltimore and Ohio, the Pennsylvania, the Cleveland, Cincinnati, Chicago and Saint Louis, and other railroads. An extensive system of electric railways furnish facilities to reach all parts of the city and many suburban and interurban localities. Natural gas is utilized largely for manufacturing and by private families for fuel and lighting. The leading industries include wholesaling and the manufacture of carriages, machinery, implements, cigars, clothing, furniture, earthenware, boilers, and engines. It has a large trade in coal, petroleum, and farm produce.

The public parks of the city cover about 200 acres and contain many improvements and attractions. Among the public structures are a fine State capitol, the State fair grounds, the United States garrison, and the Ohio State University. The capitol building is in the Doric style and cost about $2,500,000. It is the seat of the Capital University (Lutheran), the Columbus Law School, and the Columbus Art Institute. It has a hospital for the insane, asylums for the blind, deaf, and dumb, and a State penitentiary. In its public places are monuments erected to James A. Garfield, Salmon P. Chase, U. S. Grant, and W. T. Sherman. Columbus was platted in 1812, made the capital of the State in 1816, and incorporated in 1834. Its location in the center of the State and within a vast field of iron, coal, petroleum, and gas has given it marked commercial advantages. Population, 1900, 125,560; in 1910, 181,548.

COLUMBUS, county seat of Lowndes County, Mississippi, on the Tombigbee River, and on the Southern and the Mobile and Ohio railroads. It is surrounded by coal and iron fields, and has cotton mills, machine shops, foundries, and lumber yards. Columbus is the seat of several educational institutions, including the State Industrial Institute. It has a county courthouse, a public library, and waterworks. It was settled in 1830 and incorporated in 1832. Population, 1900, 6,484; in 1910, 8,988.

COLUMBUS, Bartholomew, eldest brother of Christopher Columbus, born at Genoa, Italy, about 1445; died in San Domingo, West Indies, in 1515. His early life is unknown. He made a voyage along the western coast of Africa, passing as far south as the Cape of Good Hope. In 1488 he visited Henry VII. of England to interest him in the plan of a western voyage of discovery, but failed. He accompanied his brother on his second voyage to America and was made governor of Hispaniola. When Christopher Columbus was imprisoned, he shared his misfortunes, but later was honored by being made governor of Mona. He was the founder of the colony of San Domingo.

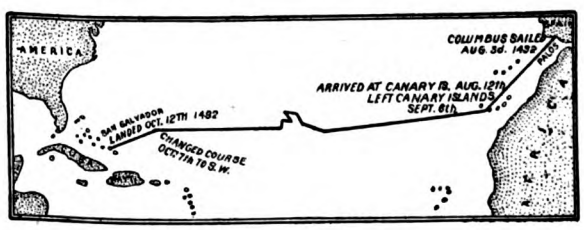
COLUMBUS, Christopher, eminent navigator, born near Genoa, Italy, about 1436; died in Spain, May 20, 1506. He became a sailor at the early age of fourteen years. His father was a wool comber and sent him to Pavia to

secure an education, where he developed a taste for astronomy and geography. He settled in Lisbon in 1470 and married the daughter of an Italian named Bartholomé Palestrello. Obtaining some charts and assistance from his father-in-law, he studied and constructed many maps. His first voyages were to the Azores, the Canaries, and the coast of Guinea.



CHRISTOPHER COLUMBUS.

In 1492 Columbus laid his plan before John II. of Portugal with the view of securing assistance and making an extended voyage of discovery, but was refused aid after the latter had submitted the plans to a body of nautical and scientific men. He next proceeded to Genoa for the same purpose, and, again failing, sailed for Spain, where he received assistance after laboring seven years at the court of Ferdinand and Isabella. The conditions upon which Columbus undertook his voyage of explorations included that he should be appointed governor general and viceroy over the lands that he might discover, with an allowance of one-tenth of the products. He set sail on Aug. 3, 1492, with 120 men and three small vessels or caravels called the *Santa Maria, Pinta,* and *Nina.* The voyager started from Palos, took a westerly course, and reached land in the Bahama group on Oct. 12, 1492; the land discovered is thought to have been Watling's or Samana Island. He next discovered Cuba and Haiti, planted colonies on them, and returned home in March, 1493.



Columbus made a second voyage the following autumn, taking with him a larger expedition, this being possible because of much interest manifested by the people of the Old World. He remained in the West Indies until 1496. His third voyage was made in 1498, when he discovered the mainland of South America at the mouth of the Orinoco, thinking he had found a continent, but supposing himself to be on the eastern coast of Asia. His fourth voyage extended from 1502 to 1504, when he explored the coast of Central America. His voyages were attended with more or less dissatisfaction and insubordination of his sailors. He was imprisoned on the third voyage by his enemies and sent in chains to Spain, but was soon released. He survived Queen Isabella a short time, dying at Valladolid. At his request his remains were taken to San Domingo, but when Hispaniola came into the possession of the French they were removed, in 1796, to the cathedral of Havana in Cuba. When Spain lost Cuba, in 1898, the remains were removed to Spain.

COLUMN (kŏl'ŭm), in architecture, a pillar or post employed for the purpose of supporting a weight, such as a roof or other superstructure. In some classes of architecture the column serves chiefly as a support, but in others it is designed both to strengthen the building and to serve as an ornament. Many designs and sizes of columns were employed by the ancients, including those that may be designated as massive, decorative, smooth, square, and polygonal. The Egyptians crowded the columns together with the view of giving the building a heavy and massive appearance, while those of the Persians and Greeks were quite tall and slender. A column consists of three parts known as the *base,* the *shaft,* and the *capital.* The base is the portion on which it rests; the shaft is the central part, usually cylindrical in form; and the capital surmounts the shaft. Among the principal columns are the Doric, Ionic, Tuscan, Corinthian, and Composite.

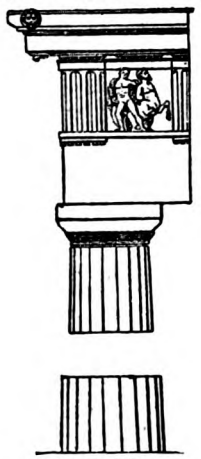
The Doric column is common among the ruins of ancient Greece and is thought to be one of the oldest classic orders. It is usually without a base and has a plain capital, and the shaft is fluted and in height is equal to five if its diameters. The Parthenon at Athens contains good examples of the Doric column. As classical architecture advanced, greater lightness and elegance were obtained by diminishing the thickness of the shaft and increasing its height. In this respect preference is given to the Ionic column, which was originated by the Asiatic Greeks, who made the shaft equal in height to eight diameters, ornamented the capital, and constructed a substantial and decorative base. A good example of the Ionic style is represented in the Erechtheum, on the Acropolis at Athens.

The Greeks originated the Corinthian style, which differs from the Ionic column in that the capital is beautifully ornamented, but it was developed in its higher artistic form by the Romans. The latter added the Tuscan, named from the Etruscans, and the Composite, which is sometimes called the Roman or Italic order. In the Tuscan style the ornamentation is simple, but the Composite column is rich with carving and sculptured decorations. The Ro-

mans increased the size of the column as well as the material used in construction and combined with it the arch and the architrave. They not only employed the column in substantial and utilitarian architecture, but utilized it in



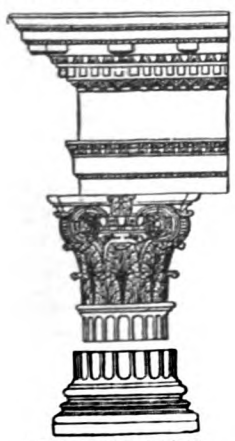
IONIC ORDER.



DORIC ORDER.

constructing monuments to commemorate persons and events, such as the Column of Antonine and the Column of Trajan.

The early Christian architecture extended the use of the column by employing it in the interiors with the arch in the churches and basilicas. It served both for decoration and in the support of the roof or galleries, the latter being placed above the principal aisles. These columns were similar to the piers or pillars of more modern



COMPOSITE ORDER.



CORINTHIAN ORDER.

times, which divide the nave from the aisles in many churches. A second row of columns was frequently introduced to support the roof above the gallery, but these were usually of the lighter Ionic or Corinthian styles, while the lower columns were modeled after the Doric order. The column is not used extensively in modern architecture, neither in constructive work or for decorative purposes.

COLVIN (kŏl'vĭn), **Sidney,** historical writer, born in Norwood, England, June 18, 1845. In 1867 he graduated at Trinity College, Cambridge, was elected fellow in 1868, and was chosen professor of fine arts in Cambridge in 1873, which position he held successively for twelve years. He was made keeper of prints and drawings in the British Museum in 1884, and previous to that time was director of the Fitzwilliam Museum, Cambridge. Besides writing for periodicals on the history and criticism of literature, he wrote extensively of the fine arts and contributed to the "Dictionary of National Biography." His published works include "Early History of Engraving in England," "Letters of Keats," "Papers of Fleeming Jenkin," "Selections from the Writings of Walter Savage Landor," and "A Florentine Picture and Chronicle."

COMA (kō'mȧ), a morbid state which is regarded a symptom of apoplexy. It is attended by heavy, unconscious sleep, stupor, lethargy, slow breathing, and fevers of the typhoid type. Coma frequently accompanies Bright's disease, alcoholic intoxication, and opium and morphine poisoning. It is advisable to arouse the patient, if possible, in cases of poisoning.

COMANCHES (kō-măn'chĕz), a tribe of North American Indians, formerly leading a roving life from the regions traversed by the headwaters of the Brazos and the Colorado to those of the Missouri. The French came in contact with them in 1719 and the Spaniards afterward engaged them in fierce wars. They were skilled hunters and warriors. Once a tribe of 12,000, they have been scattered and number about 4,000, the greater portion being located in Oklahoma.

COMB (kōm), a thin piece of horn, metal, shell, or other material with one or both edges made into teeth, suitable for cleaning, dressing, or holding the hair in place. The name is also applied to a fleshy crest on the head of a domestic fowl, especially developed in the male. The typical form is upright and notched, reddish in appearance, and often double or treble.

COMBES, Justin Louis Emile, statesman, born in Roquecourbe, France, in 1835. He was educated in a Catholic seminary and, after studying philosophy, took orders in the church with the view of becoming an ecclesiastical professor. However, he decided to study medicine and, after obtaining a degree, in 1867, he settled to practice at Pons, where he became interested in politics. In 1885 he was elected to the senate, where he showed ability as leader of the democratic party, and in 1893-94 was



M. EMILE COMBES.

vice president of the senate. He was chosen minister of education in 1895 in opposition to the clerical party, in which position he was progressive as an educational reformer, and in 1902 formed a ministry to succeed the cabinet of Waldeck-Rousseau. In this capacity he favored the separation of the church and the state, but resigned in 1905. However, his policy of suppressing religious congregational instruction was supported by the ministry that succeeded to office.

COMBUSTION (kŏm-bŭs'chŭn), in chemistry, the continuous combination of a substance with certain elements, as oxygen and chlorine, accompanied by light and heat. Generally, combustion is the action or operation of burning. *Spontaneous combustion* is caused by the internal development of heat without the application of fire. It frequently occurs in heaps of slate and refuse coal, in rags, oils, moistened hay and straw, and in other substances closely confined or stored in large quantities. The alleged combustion of the human body caused by the saturation of the internal organs with alcoholic drinks coming in contact with coal or fire is not well authenticated. It is claimed by some writers that in advanced stages of drinking, besides being advanced in life, the internal organs burn with rapidity, after which oily substances and fetid ashes remain. Most chemists believe the combustion of the human body in this way to be impossible.

COMEDY (kŏm'ĕ-dy), that branch of the dramatic art which represents the manners of common life, the object of which is to amuse by presenting the laughable incidents and humorous style. The masterpieces of French tragedy were first called *comedies,* but later the term became confined to the compositions which paint the vices and follies of mankind and describe ridiculous situations. Comedy is opposed to the tragic, serious, or ceremonial form of dramatic art. Among the widely known comedies of modern literature are the following: Goldsmith's "She Stoops to Conquer," Jefferson and Boucicault's "Rip Van Winkle," Lessing's "Minna of Barnhelm," Moliere's "L'Avare," Sheridan's "The Rivals," Sheridan's "The School of Scandal," Shakespeare's "Comedy of Errors," "Shakespeare's "Merchant of Venice," Shakespeare's "Much Ado About Nothing," Shakespeare's "As You Like It," Shakespeare's "Twelfth Night." See **Drama.**

COMENIUS (kŏ-mā'nē-ŭs), **John Amos,** educational reformer, born at Nivnitz, Moravia, March 28, 1592; died Nov. 15, 1671. He was educated at the University of Heidelberg, taught school under the direction of the Bohemian Brethren in Moravia, and afterward became a preacher of this church. In common with the Protestants of Moravia and Bohemia, he suffered many hardships under the government of Austria and sustained great losses through the Thirty Years' War. In 1628 he settled at Lissa, Poland, where he assumed the directorship of the gymnasium. While here he published the great work treating of teaching languages, especially Latin, entitled "The Gate of Tongues Unlocked." This book met with extraordinary success, being translated into a number of European and Asiatic languages.

In 1632 he was elected bishop by a synod of the Bohemian Brethren held at Lissa, and in 1639 received an invitation from England to reform public instruction there. He accepted the offer and went to London in 1641, but was prevented from accomplishing anything by the political troubles in Ireland, and the following year went to Sweden on an invitation of Oxenstiern, the chancellor of the kingdom on educational matters. The Swedish government employed him to compose a work on education, for which purpose he located at Elbing, a town of Prussia, and after four years returned to Sweden, where his work was approved by three commissioners. In 1648 he was elected senior bishop and president of the synod by the Bohemian Brethren, and in 1650 he was invited to Hungary, where he organized a school at Sáros-Pátak. His most celebrated work, entitled "Orbis Sensualium Pictus," was published at Nuremberg, Germany, in 1657, and takes rank as one of the most popular educational productions in the world. It has been variously translated under the title "The World Illustrated" and continues to be used in many countries.

The position of Comenius in the history of education is chiefly that of a reformer. He insisted upon a study of the mother tongue as of greater importance than that of Latin, which was at that time the only means of culture, and declared that a study of languages is a means of knowledge, not an end. Every language is to be learned more through practice than by rule, since rules must be grammatical instead of philosophical. He classified schools in four divisions: the mother school, that is the home; the vernacular or primary school; the Latin school; and the university. The mother school must be in every house, where the child learns the use of language and of the senses. In the sixth year the child may enter the vernacular school and, after completing its course, the mother tongue and the classical languages should be studied in the Latin school. The university should deal with universal study and fit for the particular profession. In every branch of study must be kept in mind the moral and religious side of culture, since learning is a means for the moral elevation of mankind. Children and youth must be taught by precept and example to connect this life with God, and both sexes should receive equal physical and intellectual culture as far as possible. Though equally proficient in speaking and writing the German and Czech languages, he employed the former most extensively.

COMET (kŏm'ĕt), a heavenly body so

named from the hairy appearance of its tail. Comets usually consist of three parts—the *nucleus*, the *coma*, and the *tail*. The nucleus is a bright point in the center of the head, the coma is the cloudlike mass surrounding the nucleus, and the tail is a luminous train extending generally in the direction from the sun. Some comets have no tail, others have several, while some have no nucleus. Those belonging to the last mentioned class consist of a fleecy mass known to be comets from their rapid motion in orbits. Comets, unlike planets, are not confined to the limits of the zodiac, but appear in every quarter of the heavens and move in every direction. A comet when first seen presents a faint spot of light on the background of the sky. As it approaches the sun its brightness increases, and the tail begins to become visible. The greatest brightness occurs near perihelion, but gradually fades away as it recedes, and is finally lost even to the telescope.

Comets have excited attention in every age, and until recently have inspired terror in the minds of people who were ignorant of astronomical phenomena. Superstitious fears attended their appearance, and they were looked upon as threatening the world with plague, famine, and war. The Romans looked upon the comet that appeared in 43 B. C., after the assassination of Julius Caesar, as a celestial chariot conveying his soul heavenward. Josephus enumerates among the indications of the destruction of Jerusalem "a star resembling a sword which stood above the city, and a comet that continued a whole year." Aristotle thought comets were not higher than our atmosphere, and that they consist of igneous vapors. Seneca published the opinion that comets are a kind of planets, while Tycho Brahe, in 1577, demonstrated that a certain comet was at a greater distance from the earth than the moon. The concave orbit of a comet was ascertained by Hevelius, in 1668, and the former notion that a straight line represented the path was fully disproved. Sir Isaac Newton in 1704 proved that comets obey the law of gravitation and showed that they move in elliptic orbits. Halley demonstrated in 1682 that comets are periodic in their returns and that their approach may be foretold. He proved that the comet appearing in 1531 returned again in 1607 and again in 1682, and predicted its return in 1759, in 1835, and at regular intervals of seventy-six years. This comet was named *Halley's comet* from the discoverer.

More than 600 comets have been noticed and their appearance and characteristics recorded, but it is thought that no less than 17,500,000 exist in connection with our solar system. Only a small number of this vast aggregation are visible to the naked eye, and a few attract observation on account of their superior size and brilliancy. They move in the solar system and respond to the laws of gravitation. While their orbits differ from those of the planets, they revolve round the sun. The orbit of planets is very nearly circular and they never depart so far from the sun as to be invisible to us, while the paths of the comets are extremely flattened ellipses; hence, they may be observed by us only through a very small part of their paths. Comets that travel in greatly elliptical orbits pass vast distances from the sun, but return within a fixed time. However, some are thought to have a parabolic course and to pass from our solar system. It is probable that they never return.

Some writers think there are three classes of comets—one having an orbit in the form of an ellipse, while the other two pass in paths formed like a hyperbola and a parabola. Those having a highly elliptical orbit sweep very near the sun at perihelion and recede to great distances during their aphelion. Newton estimated that the comet of 1680 was very near the sun and that it had a temperature about 2,000 times that of red-hot iron, while the comet of 1843 was about 30,000 miles from the sun and passed around that body in two hours' time. The comet of 1844 was estimated to have a distance of over 400,000,000,000 miles from the sun at aphelion. Astronomers estimated that the comet of 1680 moved at a rate of 277 miles per second in perihelion, while the velocity in aphelion was only six miles an hour. The density of comets is exceedingly small, so small that stars may be observed through them by means of a telescope. It is thought that the earth passed through the tail of a comet in 1861, its presence



DONATI'S COMET.

being indicated by a peculiar phosphorescent mist. While it is believed that a comet coming in contact with the earth would disturb or destroy the surface at the point of direct contact, it would not dangerously affect the earth's orbit.

It is not known whether comets shine by their own or by reflected light, but the latter seems to be the most reasonable, since they become invisible on going away from perihelion. They are thought to decrease in brilliancy at each successive revolution round the sun. At the first appearance no tail is visible and the light is faint. With the increase of velocity, as it

approaches the sun, the brilliance increases and the tail shoots out from the coma and becomes longer and of greater splendor each day. The tail of the comet of 1843 increased in length 5,000,000 miles per day. The length of the tail depends upon the size and velocity of the comet. It often reaches a length of 200,000,000 miles. Examination and analysis of the light of comets by the spectroscope have shown that these bodies are composed chiefly of carbon combined with oxygen. Few other elements have been found, but those known to exist in comets include iron, sodium, magnesium, and nitrogen.

Among the remarkable comets is one that appeared in 1811. It had a head whose diameter was 112,000 miles, the nucleus was 400 miles, and the fan-shaped tail stretched out 112,000,000 miles. Its distance at aphelion was estimated at 4,000,000,000 miles, fourteen times that of Neptune, and it is announced to return in thirty centuries. *Halley's comet,* mentioned above, is one of the most remarkable and best known. It appeared in 1910 and has a period of 76.08 years. *Donati's comet* was discovered by Dr. Donati of Florence, June 2, 1858. Its periodic time is about 2,000 years. *Biela's comet* was discovered by W. Biela, a German officer of the Austrian army, on Feb. 28, 1826. The periodic time of this comet is about 138 weeks. It returned in 1832, in 1839, and in 1845. In 1846 it was separated into two comets, which came back together in 1852. Though it has not been observed since, its periodic time has been distinguished by a more or less prominent display of meteors. These displays occurred notably in 1867, in 1872, and several times since. *Encke's comet* was discovered by Johann Encke, director of the observatory at Berlin, Germany, in 1819. It has a periodic time of 1,210 days, and an orbit which is nearer to the sun at all points than that of Jupiter. Encke proved that this comet is identical with the one appearing in 1786, in 1795, and in 1805. With its appearance in 1822 and 1828 it was accurately examined and measured, and former observations were verified at its reappearance in 1881.

COMMENCEMENT (kŏm-mĕns'ment), the occasion on which degrees are conferred by colleges and universities upon their graduates. The term is employed in the University of Cambridge, England, and in other institutions of Great Britain to designate the day when masters of art and doctrines received their degrees. In the United States it has reference to the elementary and secondary schools as well as the institutions of higher learning, and the exercises, usually held at the close of the school year, are meant to indicate the commencement of a fuller life after graduation. The alumni of many institutions hold a reunion at the time of the commencement, and usually the literary societies hold annual meetings and the president of the institution receives the report for the past year. Members of the class deliver orations, those of the highest rank being assigned the places of *salutatorian* and *valedictorian,* and frequently an address or oration is delivered by a prominent educator or public man. Commencement exercises may be considered a potent agency in stimulating educational zeal among the students and their friends, and in promoting a spirit of attachment among the graduates to their Alma Mater.

COMMERCE (kŏm'mĕrs), the exchange of goods or property of any kind, especially the exchange on a large scale between states, nations, and colonies. The foreign commerce of the United States, including exports and imports, is exceeded in value only by the commerce of Germany and Great Britain, although the interior commerce of the United States is greater than that of any other country. In fact the collection of raw material from the various portions of the United States at the points of manufacture or export, the distribution of manufactured products, and the distribution of foreign imports give rise to a commerce exceeding in extent the commerce of any other two nations in the world. This vast commerce has resulted largely from the building of extensive railroads, canals, and other avenues of transportation. Incident to it are the construction of factories and the location of vast storehouses. The larger commercial centers are in the cities, where the principal railroads converge and the vast factories and storehouses for distribution are located.

The Phoenicians were the great commercial nation of the ancient world. Their primitive seat was at Sidon and their next center was at Tyre. The prophet Isaiah speaks of Tyre in these words: "The crowning city whose merchants are princes, whose traffickers are the honorable of the earth." This was written about 588 B. C. Their trade was extended to all parts of the world which were known at that time. The Greeks and Romans ranked as commercial nations. In the Middle Ages the Venetians, the Hanseatic towns, and Flanders took the lead in commerce. With the discovery of America the Spaniards, Portuguese, Dutch, and British developed vast commercial interests, though the Hanseatic towns in Germany remained important commercial centers.

Germany and Great Britain both have a larger foreign commerce than any other nation of the world. In this respect the two countries are about on the same footing, sometimes one and then the other standing at the head, with the tendency of growth being in favor of Germany. In 1914 the commerce of the countries named was as shown below:

Country	Imports	Exports	Total
Canada	$340,374,745	$272,206,606	$612,581,351
France	1,064,587,361	910,650,450	1,975,237,811
Germany	2,395,850,280	1,719,600,925	4,115,451,205
Great Britain	2,390,680,240	1,690,325,840	4,081,006,080
United States	1,434,421,425	1,880,851,078	3,315,272,503

COMMERCE, Chamber of, a board or association organized by the merchants and traders of a city to protect the interests of commerce. Organizations of this kind are very common in the cities of Canada and the United States, where they are maintained to further the interests of trade and to build up manufacturing and commercial enterprises. Usually they work in harmony with the town or city council, and frequently petition the Legislature for the enactment of laws favorable to the extension of trade relations within the states and provinces, or among the different sections of the nation. These organizations have been united to a large extent in building up a system of international chambers of commerce, which is designed to promote trade within the country and on a larger scale with foreign nations.

COMMERCE AND LABOR, Department of, one of the executive departments of the United States. It was created by an act of Congress on Feb. 11, 1903, and is under the direction of a secretary, who is a member of the Cabinet. The head of this department, like the other cabinet officers, is appointed by the President, subject to confirmation by the Senate, and the salary is $12,000 per year. The duty devolving upon this department, as set forth in an act of Congress, is to foster, promote, and develop the domestic and foreign commerce of the United States, manufacturing, mining, and the fishery industry. It is incumbent upon the department to promote improvement of transportation facilities, supervise the business of insurance, and develop the interests of labor. George Bruce Cortelyou (born 1862) was made the first Commissioner of Commerce and Labor, but he resigned in 1904 and was succeeded by Victor H. Metcalf (born 1853), of California.

The Department of Commerce and Labor includes an effective organization of bureaus. These are the Bureau of Labor, Bureau of Corporations, Bureau of Navigation, Bureau of Manufactures, Bureau of Standards, Bureau of Foreign Commerce, Census Bureau, and Bureau of Statistics of the Treasury Department. With it are affiliated the steamboat inspection service, the lighthouse board, the lighthouse establishment, the immigration service, and the fish commission. The Bureau of Corporations is presided over by a commissioner of corporations. This officer receives a salary of $5,000 per annum, and has partial jurisdiction of the investigation and control of trusts and trade combinations. It is his duty to investigate any corporation of joint-stock companies engaged in commercial pursuits, both domestic and foreign, except common carriers. In 1913 the department was reorganized as the two Cabinet positions of Secretary of Commerce and Secretary of Labor, with William C. Redfield as head of the former and William B. Wilson as head of the latter.

COMMERCIAL LAW, or **Mercantile Law,** the branch of law which regulates the affairs of trade and commerce. It originated largely from the customs of merchants in the Middle Ages, when the peaceful arts of exchanging commodities began to replace the methods employed by the stronger nations in conquering the less powerful peoples. Though the relations of the citizen to his family and the state may differ widely under climatic and economic conditions, it must be admitted that some satisfactory arrangement for buying and transmitting commodities can be devised among the nations of the world. Besides, each of the nations has a system of commercial law which refers particularly to the domestic trade. It includes the enactments that refer to contracts, promissory notes, bills of exchange, deeds of trust, etc.

COMMISSARY (kŏm'mĭs-să-rў), in military, the term applied to the civil officer appointed to inspect the musters' stores and provisions of the army. During the times of war a number of commissaries are appointed, each being charged with some specific department of duty.

COMMISSION (kŏm-mĭsh'ŭn), a document issued by civil authority conferring designated rank, power, or authority on the person or persons therein named. The instrument bearing this title is issued by the government to officers in the navy and army, postmasters, justices of the peace, and other similar officials. Another class of commissions are those granted to a number of persons who are intrusted with the performance of certain duties of a legal or public character.

COMMITTEE (kŏm-mĭt'tē), one or more persons appointed or chosen by a larger number, or by an organized body, to give special attention to some matter or to perform some service. In legislative bodies committees are appointed in special lines of legislation to examine bills of a particular character and to report on the advisability of their passage. The whole body often resolves itself into a committee to consider any bill or matter, in which case the chair is occupied by some member, called the chairman of the committee. The *Committee of Public Safety* was made up of members of the French national convention during the first revolution. In 1792 the national convention abolished the monarchy and proclaimed a republic. The Committee of Public Safety was appointed on April 6, 1793, and had authority to supervise the work of several committees, among whom the executive functions of the government were divided. Later extended powers were vested in this committee and all the executive authority passed into its hands. The communists established a similar committee in March, 1871, but it fell about two months later.

COMMODORE (kŏm'mŏ-dōr), a naval officer of the United States, ranking next above a captain. A commodore generally has command

of a few ships of war when they are detached for any purpose from the rest of the fleet.

COMMON LAW, the law of England which rests for its authority upon usage and universal acceptance, rather than upon any express and positive declaration of a legislative body. Blackstone classified the civil law of England under two divisions, the *statute law* and the *common law,* and defined the latter as a system of laws which consist of general customs and are accepted by particular courts. The common law is overruled by a statute law, but has precedence in cases in which equity is opposed to it. The State courts of the United States as well as the courts of the provinces of Canada rely upon the English common law, which constitutes the basis of the jurisprudence of these countries. However, Louisiana is an exception to this rule, since the laws in that State are based quite largely upon the jurisprudence of France.

COMMONS, the term applied to the common people as distinguished from the nobility. In England the term includes all the people below the peers, comprising the class represented in the lower house of Parliament, the House of Commons. The term is applied in the same way to the Parliament of Canada.

COMMON SCHOOLS, the term usually applied to the public schools below the high school, although the educational system of the cities includes schools of several grades, such as primary, grammar, high, and manual training schools. Those located in the rural district are called district schools, being under the supervision and control of the officers of the school district, and those situated in the wards of a city are sometimes called ward schools. The schools of most countries are not organized and maintained under a national law, but are usually supported and controlled by the states or provinces, or are dependent largely upon local taxation. The courses of study in the common schools cover eight grades, or years, and outline the study in the common branches, which include chiefly reading, writing, spelling, arithmetic, geography, history, physiology, and grammar. In some of the states and provinces a number of other branches are included, such as music, algebra, drawing, botany, and civil government. These are supplemented in the high schools by courses covering four years of more advanced work. See **Education; Schools.**

COMMONWEALTH (kŏm'mŭn-wĕlth), a state in which the government is vested in the people, as in a representative republic. The term was applied to England after the execution of Charles I., Jan. 30, 1649, soon after which Oliver Cromwell became protector. It ended with the restoration to the throne of Charles II., on May 29, 1660.

COMMUNE (kŏm-mūn'), the smallest territorial and administrative division of France and Belgium. It is the unit for local self-government and is regarded a legal body, hence may sue and be sued, contract debts, and buy and sell property. The chief officer, called the *mayor,* is assisted by a deliberative assembly known as the *conseil municipal.* Communes usually embrace several villages, but sometimes coextend with a town or city, or several communes are located within the same city. Those having a population of more than 3,000 are more largely under the direction of the central government, by which the mayor is appointed, while the chief officer in the smaller communes is appointed by the prefect of the department.

COMMUNE OF PARIS, a revolutionary committee organized in Paris in the French revolution of 1789, which soon absorbed the supreme authority in the government. The leading characters included Danton, Marat, and Robespierre. Of this triumvirate Marat was assassinated July 13, 1793, Danton was guillotined on June 5, 1794, and Robespierre met the same fate on July 28, after being captured at the headquarters of the commune at the Hôtel de Ville. The same name was applied to an insurrection in Paris which occurred on March 18, 1871. The organization was formed to carry out the traditions of the old revolutionary commune, and was proclaimed on the 28th. This occurred after a siege by the Germans, when the people gave evidence of much discontent with the government. Among the notable deeds were the burning of the Tuileries and the Hôtel de Ville, the destruction of the Column Vendome, and the defacement of many notable buildings of historic interest. For ten weeks the most bloody and desperate fighting continued, and during the last ten days of May fully 65,000 communists were killed. On May 28, 1871, Paris was taken by storm and the Commune fell, many of the leaders being either executed or transported.

COMMUNISM (kŏm'mû-nĭz'm), the theory of government and social order according to which property is held as a common trust, and the profits derived from all labors are devoted for the general good. This theory involves the abolition of all private property and the transfer of everything possessed by individuals to the state, which is then charged with the task of assigning work to each of the citizens and dividing the profits among them. There are several communistic bodies in the United States. A number of them are religious organizations, such as the Shakers, Altruists, Church Triumphant, Bruderhof, Mennonites, and Separatists. Besides these are societies known as the Amana Community, the Harmonists of Harmony, Pa., and the Oneida Community of New York. A certain form of cummunism was advocated by Robert D. Owen in his publication of "New View of Society" in 1833, in Great Britain. He attempted to found a society on the new plan, without government assistance, on the banks of the Wabash in 1825, but was unsuc-

cessful. The most prominent communistic leaders in France included Saint Simon, Proudhon, and Fourier, who operated as communists; in Russia they are known as nihilists, and in Germany as socialists. The Amana Community, located in Iowa, has been quite successful, but many of the communities have not realized the hopes of their organizers. See **Brook Farm.**

COMMUTE (kŏm-mūt'), to pay in gross less than would be paid for each separate item combined, or accept an easier, lighter, or different kind of payment, obligation, or service instead of one formerly understood. The term is applied in judicial proceedings to an alteration or reduction of a sentence, as the commutation of the death penalty to imprisonment for life.

COMO (kō'mō), a lake in Lombardy, northern Italy, located at the foot of the Alps, and formed mainly by the Adda River, which enters it at the north and flows from it at the southeastern extremity. The lake is about two and one-half miles wide and about thirty-five miles long. Its excellent climate and beautiful scenery have made it the most celebrated pleasure resort in Italy, and caused its shores to be studded with fine villas, vineyards, and gardens. It was once the residence of Queen Caroline. Trout and other valuable fish abound. The lake is visited by large delegations of pleasure seekers.

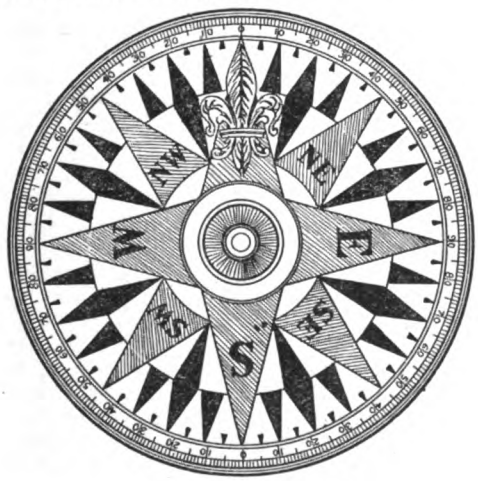
COMO, a city of Italy, in the province of Como, twenty-five miles northwest of Milan, with which it is connected by a railroad. It is situated at the southwestern end of Lake Como and is surrounded by a picturesque country. It has a fine gothic cathedral of the 14th century. Among the chief manufactures are silks, woolen textiles, velvet, cigars, and machinery. It has a brisk trade in merchandise, fruit, and earthenware. The public utilities include a museum, a public library, waterworks, and electric street railways. Como is the birthplace of Volta, Innocent XI., and Pliny the Elder and the Younger. It was anciently known as Comum. Population, 1916, 39,125.

COMORO ISLANDS (kŏm'ō-rō), or **Comores,** a group of volcanic islands in the Mozambique Channel, between Africa and the northern extremity of Madagascar. The islands include Mohilla, Comoro, Johanna, Mayotta, and a number of smaller islets. The total area is 790 square miles. They have a fertile soil, though they are of volcanic origin, and produce fruits, sugar cane, and rice. These islands were ceded to France in 1886 and are governed as a dependency of Réunion. The inhabitants are chiefly of Arabic and Negro descent and profess Mohammedanism. Population, 1916, 75,500.

COMPANY (kŭm'pà-nỹ), in business, a number of persons associated for carrying on any business, or for the performance of any duty. The shareholders divide the profits among themselves in proportion to the amount of capital invested. The term is applied in infantry to the smallest command of a captain. In 1917 the United States increased the full strength of a company to 250 men and six officers.

COMPARISON (kŏm-păr'ĭ-sŭn), the act of setting forth the points of similarity or contrast between one thing or person and another. In grammar comparison is that inflection of adjectives or adverbs which indicates difference in the degree of quality. The three degrees of comparison are *positive, comparative,* and *superlative.* The last two are usually expressed by adding er or est to the positive, or by using more or most, less or least, before it. Great, greater, greatest; truthful, less truthful, least truthful are examples of comparison.

COMPASS (kŭm'pąs), an instrument for determining direction by means of a poised magnetic needle. In surveying, such an instrument is used for measuring horizontal angles. It consists of a rotating telescope, mounted above a card showing the cardinal and other points. In electricity, an instrument known as a compass is employed for measuring the intensity of a voltaic current, in which a small needle is placed. The intensity of a current is measured from its proportion to the angle of deflection. This deflection is ascertained by the instrument, after which its corresponding value is obtained from a table of tangents.



MARINER'S COMPASS.

In nautics the *mariner's compass* is used to determine the course of a ship. It is usually inclosed in a box and this is again placed in a larger one, called a *binnacle,* and located in the back part of the vessel. The essential part of the mariner's compass is the magnetized needle. This is fastened to the lower part of the card, which is made of a leaf of mica, an ordinary cardboard, or some similar substance. The arrangements are so constructed that the card revolves with the needle. On it the four *cardinal points,* north, east, south, and west, are

marked and some smaller divisions are indicated so as to constitute thirty-two in all, each one having a name compounded from the cardinal points. The compass is supported on gimbals to keep it in a horizontal position, notwithstanding the moving and rocking of the ship. In large iron or steel vessels a notable deviation of the north and south line from the magnetic meridian is ordinarily noticed, which is due to the permanent magnetism of such vessels. To overcome this a permanent steel magnet is placed in the vicinity of the compass, by means of which an opposite attraction to that due to the ship is exerted with equal force. The helmsman carefully observes the movement of the compass when steering the ship so as to move forward in a continuous and proper course.

It is believed that the Chinese were the earliest inventors of the mariner's compass, using it first on land and afterward to guide ships on the sea, but the name of its inventor is not known. It was brought to Europe by Marco Polo, a Venetian traveler, in 1260. The Swedes knew of the compass in 1250, in the time of King Jarl Biger. The variations at different degrees of longitude were first discovered by Columbus in 1492, and rediscovered by Sebastian Cabot in 1540. The hanging compass now used was invented in 1608.

COMPASS PLANT, an annual plant of the Compositae order, native to the prairies of the Mississippi Valley. It was so named from its radical leaves, which are sensitive to the light and in midsummer point quite nearly to the north and south. Asa Gray, the noted botanist, attributed this property to the fact that both surfaces of the leaves are equally affected by the light, hence their edges are turned vertically and their tips assume a north and south position so as to receive an equal amount of illumination on both sides. The stems contain a large per cent. of resinous matter, hence the plant is known locally as *resin weed.*

COMPOSITAE (kŏm-pŏz'ĭ-tē), an order of plants, distinguished by compound or composite flowers. The order is given various designations by writers, such as aster family, composite family, sunflower family, and thistle and chicory families. About 12,000 species of this order have been described, hence it is the largest family of plants that bear flowers. The heads of flowers are composed of a number of florets congregated upon a common receptacle, which is surrounded by bracts in the form of leafy or scaly involucres, giving the appearance of a single flower. In many species the florets are so uniformly arranged that it is common to speak of the aggregation as a flower, instead of referring to the individuals that make up the head as separate and distinct blossoms. However, in some species the florets differ materially in shape, size, and color, and those near the outside are frequently imperfect and sterile. In the typical flower the stamens are five in number and are united together by their anthers, and the ovary has one cell and one ovule. The corolla is above the ovary, and is either tubular or strap-shaped, both forms frequently occurring in the same plant. Many species of this order are cultivated for ornaments, such as the aster, daisy, goldenrod, dahlia, and chrysanthemum. Others are important for their medicinal value and for food, including the sunflower, chicory, tansy, salsify, lettuce, dandelion, chamomile, arnica, wormwood, artichoke, etc.

COMPRESSED AIR (kŏm-prĕst'), the name applied to atmospheric air compressed by means of pumps and utilized to propel machinery by the general force of expansion. It is used for propelling engines constructed quite like steam engines, the force of the expanding air being exerted against a piston in a cylinder. It has been made serviceable in water pumps, in elevators, facing machines, hydraulic presses, motors, railroad engines, brakes, hydropneumatic hoists, for ventilation, and various other purposes. In compressing air sufficiently to force a hundred cubic feet to occupy one cubic foot, it becomes very hot and loses some of its force in cooling. However, it serves a useful purpose in many respects, especially in rock drills, mining machinery, and various other purposes in the industries. The first attempt to utilize compressed air was made in 1700, since which time many improved machines have been invented and its use has been vastly extended. See **Air Compressor.**

COMPROMISE (kŏm'prō-mīz), an agreement entered into between two parties to refer a matter in dispute to arbitration, and to abide by the decision of the arbitrator. In recent years compromises have been the means utilized extensively to settle various disputes between nations, such as the boundary dispute between the United States and Canada and that of Venezuela and British Guiana. See **Ashburton Treaty.**

COMPROMISE OF 1833, a tariff measure passed by the Congress of the United States in 1833, as a compromise for the high tariff act of 1828. The latter had caused intense dissatisfaction in the Southern States, and its strict enforcement brought about the nullification by South Carolina and a threat that the State would secede from the Union. Henry Clay proposed a compromise in the Senate, but the House took up the issue and passed a bill which became a law, though it was practically the same as that introduced by Clay in the Senate. It was designed to reduce the high duties gradually, until after ten years a free trade basis should be reached.

COMPROMISE OF 1850, a name given to a series of measures passed by the Congress of the United States in 1850, designed as a compromise between the antislavery and proslavery parties. Clay's Omnibus Bill was proposed and

defeated a short time before and the two were practically identical. The compromise provided that Texas was to receive $10,000,000 for New Mexico; California was admitted into the Union under a free constitution; Utah and New Mexico were organized as territories, with the power to adopt or reject slavery; the Fugitive Slave law was enacted, under which fugitive slaves were returned when their owners made certain affidavits; and redress to free colored seamen imprisoned in Southern ports was prohibited. Henry Clay, Daniel Webster, and John C. Calhoun made celebrated speeches upon the various compromises. The measures thus enacted after much controversy were rendered futile when Stephen A. Douglas introduced his Kansas and Nebraska Bill, in 1854, when the whole controversy was opened anew in Congress and on the plains of Kansas.

COMSTOCK LODE (kŭm'stŏk), an extremely rich metallic vein on the eastern slope of the Virginia Mountains, in the western part of Nevada. In this large and productive vein the Big Bonanza and other mines have produced gold and silver to the value of $350,000,000. It was discovered in 1859. The depth of the mines is about 2,250 feet.

COMTE (kônt), **Isadore Auguste Marie François Xavier,** founder of the positive system of philosophy, born at Montpellier, France, Jan. 19, 1798; died Sept. 5, 1857. He studied at Paris and became well known for his boldness and novelty in speculative philosophy. In 1820 he was employed to draw up a statement of doctrines taught at Saint Simon's school. He commenced a course of lectures on positive philosophy in 1826, but gave only four lectures, owing to a derangement of his mind. However, he soon recovered his faculties and took up his studies and lectures again. He began work on his "Course of Positive Philosophy" in 1830 and completed it twelve years later. It was translated into the English by Harriet Martineau. His views were very original and comprehensive and excited much attention among students and thinkers in Germany, France, and England. According to the philosophy of Comte there are three stages in the development of mankind, the theological, the physical, and the positive. In the first stage man refers all phenomena to some supernatural being, in the second he seeks to demonstrate the existence of some abstract force or essence, and in the third he no longer seeks a cause or essence, but is content to study the phenomena of existence and reduce particular facts to more general facts.

CONCENTRATION (kŏn-sĕn-trā'shŭn), in pedagogy, the connection between the parts of each study and such a spinning of relations and connecting links between different sciences that unity may spring out of the variety of knowledge. Herbart was the first educator to make use of the term, and it is now employed quite generally by the Herbartians. The theory of concentration makes the child's mind the center for concentrating efforts in education, and utilizes the natural tendency of the mind to unify all its ideas, feelings, and incentives. Consequently concentration is concerned chiefly with the relation of different studies to each other.

CONCEPCION (kŏn-sĕp'shŭn), a seaport city of Chile, capital of a province of the same name, on the Biobio River, about seven miles from its mouth. It is a well built city and has a number of public buildings and a cathedral. Many of the streets are paved with stone, lighted by electricity, and traversed by electric railways. Its port is Talcahuano on the Bay of Concepcion, about eight miles distant, and one of the most important in Chile. The city was founded in 1550 by Pedro de Valdivia (1510-1554). It suffered at various times by attacks of the Araucanian Indians and has been damaged frequently by earthquakes. Population, 1916, 61,786.

CONCEPTION (kŏn-sĕp'shŭn), the formation of an idea or image in the mind. It consists of a conscious act of the understanding, bringing an object or impression into the same class with a number of other objects or impressions, by means of some character or characters common to them all. *Perception,* by which individual ideas are acquired through the senses, is the first step in forming ideas or concepts. The power of conception depends largely upon the ability of the mind to separate ideas and classify them according to qualities, and then group them into a class. To cultivate this faculty it is necessary that the mind receive clear and definite ideas of objects and their properties, that they be deeply impressed so they may be permanently retained and readily recalled, and that they be associated according to their intrinsic or logical relations. Conceptions of the highest order can be obtained only by a close and accurate observation of the objects from which they are derived. When training the perception, the instructor is at the same time training the conception, but the latter process is relatively more important than the former. In forming conceptions the mind is greatly influenced by its feeling, and the concepts formed under circumstances causing deep emotion, either of pain or pleasure, remain almost indelibly.

CONCERTINA (kŏn-sĕr-tē'nà), a musical instrument in which the sounds are produced by admitting air through metallic reeds, as in the accordion. It was invented by Charles Wheatstone in 1829. The form is hexagonal and at each end is a keyboard, which is worked by the finger while drawing out and pressing the bellows to obtain a pressure of air, which works on the reeds as the keys are pressed. Every sound in the scale is double and can be produced by pulling or pressing the bellows.

CONCH (kŏnk), a name applied to many marine univalve mollusks, especially to the rose-

lined *stromb* of Florida and the West Indies. Large quantities of these mollusks are obtained in the Bahama Islands, where they are gathered and exported for cutting shell cameos. The fleshy parts are prized as food by the natives and the Indians use the shells in making white wampum. The *triton* of the East Indies has a large spiral shell that is known as conch, and, like that of the stromb, may be perforated and fitted with a mouthpiece and finger holes and used as a sonorous musical instrument.

CONCHOLOGY (kŏn-kŏl'ŏ-jў), the science of shells. See **Shells.**

CONCLAVE (kŏn'klāv), the apartments where the cardinals of the Roman Catholic Church assemble for the election of the Pope, or the assembly of cardinals convened for that purpose. The cardinals are permitted to appoint the place for the election, but the conclave is usually held in the Vatican or the Quirinal palace at Rome. They assemble on the tenth day after the death of the Pope, the meeting being in a large hall connected with small rooms, two of which are assigned to an ordinary cardinal and three to one of princely rank. The deliberations are held in privacy and all of the members of the conclave are locked in and attended by two or three conclavists or attendants. No communication is allowed with any one on the outside, and the food is carefully inspected so no concealed missive may reach the conclave. The vote is by ballot taken twice a day until it is possible to secure an election, for which a two-thirds vote is necessary.

CONCORD (kŏn'kĕrd), a town of Middlesex County, Massachusetts, on the Concord River, and on the Boston and Maine Railroad. It is the seat of the Massachusetts Reformatory, has a public library, and is a market for fruit and produce. The manufactures include harness, clothing, and rubber goods. At the bridge across the river the first shots of the American revolution were fired on April 19, 1775. A monument marks the spot where several British soldiers fell. The Battle of Lexington commenced at Concord, the Americans pursuing the British, who were on a rapid retreat. At that time the population of Concord was 1,300, and it sent 174 men to the army in 1775. The soldiers' pay was raised by the town. Among the persons of literary eminence who made their home at Concord are Alcott, Hawthorne, Emerson, and Thoreau. The town was founded in 1635. Population, 1905, 5,421; in 1910, 6,421.

CONCORD, the capital of New Hampshire, in Merrimac County, on the Merrimac River, 58 miles northwest of Boston. It is on the Boston and Maine Railroad and several electric interurban lines. The river divides the city into two parts, which are connected by a large number of bridges. The streets are well paved, lighted, and otherwise improved. It has street railways, waterworks, and a sewer system. Among the educational institutions are the high school and the Saint Paul's School. The city has a public library of 15,000 volumes. Among the noteworthy buildings are a State insane asylum, the city hall, two orphanages, a home for the aged, the State prison, and a beautiful State house built of granite. The manufactures include hardware, carriages, woolen and cotton fabrics, cutlery, flour, shoes, and musical instruments. Near it are some of the most valuable granite quarries of the East. It as first settled in 1725, when it was known as Pennock. In 1816 it b came the State capital and was incorporated as a city in 1853. Population, 1910, 21,497.

CONCORD, a city in North Carolina, county seat of Cabarrus County, twenty miles northeast of Charlotte, on the Southern Railroad. It has a public library, several county buildings, and a number of educational institutions. The manufactures include cotton goods, ironware, cigars, and machinery. The city has good municipal improvements. It was settled at an early date in the Colonial period and was incorporated in 1793. Population, 1900, 7,910; in 1910, 8,715.

CONCORDANCE (kŏn-kôrd'ans), an index in alphabetical order to the words or topics of a book, especially such an index to the Bible. The first known concordance of the Bible in any language was that prepared by Saint Anthony (1195-1231), who issued such a work in the early part of the 13th century under the title of "Concordantiae Morales in Sacra Biblia." This work is a concordance of the Latin Vulgate. A more elaborate edition was prepared, using Saint Anthony's as a basis, and published in 1244. Since then various concordances have been published in the Greek, English, German, and other languages. The same name is applied to a work designed to facilitate reference to other works, such as were published to Shakespeare in 1790, Milton in 1856, and Tennyson in 1870.

CONCORDAT (kŏn-kôr'dăt), any public act of agreement, as a treaty. The term is applied most frequently in papal history to an agreement between a papal see and a secular power for the settlement and regulation of the ecclesiastical affairs. Among the most prominent concordats are those concluded between Pope Calixtus II. and Emperor Henry V. of Germany, in 1122, which still regulates, to a limited extent, the affairs of the Catholic Church of Germany. A concordat was effected between Pope Leo X. and Francis I. of France in 1516, by which the election of the bishop and of several sees was regulated. The concordat between Pius IX. and Emperor Francis Joseph I. of Austria, in 1855, made provisions whereby the legal powers of the papacy were defined in application to the empire. It was set aside in all the dominions of the Emperor of Austria in 1868. Many other concordats were made with different countries.

CONCRETE (kŏn'krēt), in arithmetic, a term used to designate a number or quantity applied to certain persons or things as op-

posed to an *abstract* number. Thus, the expressions five men or eight bushels are concrete numbers; five and eight are abstract. In logic, the name concrete is applied to any quality which is considered in connection with the object to which it belongs. Thus, *wisdom*, when spoken of alone, is abstract, but when we speak of a *wise man* the quality is concrete.

CONCRETE, an artificial stone composed of a mixture of gravel or broken stone, sand, and hydraulic cement. The proportions of material depend upon the purpose for which concrete is to be used. In most engineering works one part consists of cement, one to three parts of sand, and four to six parts of gravel, broken stone, pebbles, shells, or some other hard material. The value of concrete in construction work consists in its property of changing from a plastic condition into a hard and rigid stone, due to the fact that the cement paste sets and hardens with age. It is estimated that concrete composed of two parts sand, one part cement, and six parts broken stone at the age of one year has a compressive strength of from one to two tons per square foot.

Within recent years concrete has become exceptionally popular as building material. This is true in all construction work, such as bridges, dams, foundations, and even large dwellings. For the last-mentioned purpose hollow concrete building blocks have come into extensive use. A fine example of the value of concrete is seen in the great sea wall at Galveston, Tex., which is about five miles in length and seventeen feet high, and supplies a safe and efficient protection of the city from overflows of the sea. This sea wall was constructed at an outlay of $3,505,040. Concrete has also come into use in the construction of lighthouses and to reënforce breakwaters. An example of the former is in the lighthouse recently completed at the mouth of the Boug River, flowing into the Black Sea.

Prof. I. O. Baker summarizes the use of concrete in "A Treatise on Masonry Construction," as follows: "Concrete is admirably adapted to a variety of most important uses. For foundations in damp and yielding soils, and for subterranean and submarine masonry, under almost every combination of circumstances likely to be met with in practice, it is superior to brick masonry in strength, hardness, and durability; it is more economical, and in some cases is a safe substitute for the best natural stone, while it is almost always preferable to the poorer varieties. For submarine masonry, concrete possesses the advantage that it can be laid, under certain precautions, without exhausting the water, and without the use of a diving bell or submarine armor. On account of its continuity and impermeability to water, it is an excellent material to form a substratum in soils infested with springs; for sewers and conduits; for basement and sustaining walls; for columns, piers, and abutments; for the pointing and backing of walls faced with brick, rubble, or ashlar work; for pavements in areas, basements, sidewalks, and cellars; for the walls and floors of cisterns, vaults, etc. Groined and vaulted arches, and even entire bridges, dwelling houses, and factories in single monolithic masses, with suitable ornamentation, have been constructed of this material alone."

CONDÉ (kon'dā), **Louis II. of Bourbon,** called the Great Condé, born Sept. 8, 1621; died at Fontainebleau, Dec. 11, 1686. Being a son of Henry II. of Bourbon (1588-1646), he received a liberal education. He entered upon a military career at an early age, took part in the sieges of Arras and Perpignan, and commanded the French forces against the Netherlands, where he won a noted victory at Rocroy in 1643. He was sent to Alsace in the same year and defeated the Bavarian army under Gen. Mercy near Freiburg, conquering a portion of Germany for France. In 1646 he became the head of his family by the death of his father, and was second to the Duke of Orleans in the state. He captured Dunkirk the same year, his preëminence exciting the envy of Cardinal Mazarin. In 1648 he was intrusted with the command of the army in the Netherlands, when he captured several important points, and was called back to Paris by the War of the Fronde.

In the beginning of his career Condé was in sympathy with the court party in France, but, owing to ill treatment by Mazarin, he put himself on the side of the opposition, which resulted in his imprisonment for one year. After his release he negotiated with Spain, collected troops in the Netherlands, gained the Battle of Bleneau in April, 1652, and marched upon Paris. A fierce but indecisive battle occurred on the streets of Paris, which did not terminate in a satisfactory agreement. When a war broke out between France and Spain, he was made generalissimo in the Spanish army, but was defeated by Turenne. After the conclusion of peace between France and Spain, he was pardoned and reinstated in his former honors. In the War of 1673 he again commanded the French forces in the Netherlands against Spain, and after the death of Turenne was commander in Germany, but later resigned his post. Soon after he retired to his estate of Chantilly, where he became devoted to literature and enjoyed the society of his friends. He was classed as a man of superior intellect, great pride, and strength of character.

CONDENSED MILK (kŏn-dĕnst), an important article of commerce made of cow's or goat's milk. The milk is placed in vacuum pans and evaporated to about one-fourth of its volume. Sugar is added to the amount of about one pound to the quart of condensed milk. The manufacture of this article is enlarging continually. See **Milk.**

CONDIMENT (kŏn'dĭ-mẹnt), any seasoning or sauce used to excite the appetite by com-

municating a pungent taste to food with which it is mixed. Many condiments assist in digestion, and, by tempting the palate, stimulate the appetite and increase the amount of food consumed. Among the most common are salt, pepper, mustard, nutmegs, vinegar, cloves, horseradish, and pickles. It is necessary to exercise moderation in using condiments, as an over consumption is injurious to digestion.

CONDOR (kŏn'dŏr), the largest vulture of South America, native principally to the Andean regions of Chile, Peru, and Colombia. The favorite haunts of this bird are elevations in the mountains, usually from 4,000 to 16,000 feet, but at times it soars to the tremendous elevation of 21,000 feet above the level of the sea. It floats with outstretched and motionless wings in airy circles. The size is about nine feet



CONDOR.

measured from wing to wing and four feet from the beak to the end of the tail. Humboldt found none exceeding this measurement, though rare specimens have been found that measure eleven feet from wing to wing, and in one instance a condor was captured which measured as much as fourteen feet. The head and neck are bare, the former being flattened at the top and crowned with a comb on the head of the male. The plumage is usually a deep black with a tinge of gray. The wing coverts in the males are white, and the legs are bluish gray. The powerful talons are large, but quite smooth and blunt.

These birds make no nest, but instead lay their eggs on the bare rocks, usually two in number, which are hatched after seven weeks by the warmth of the sun. The young are covered with down of a whitish color, reaching maturity at two years, and accompanying their parents for some time after being able to fly. The mountain heights are their favorite abode, to which they return after descending into the valleys and plains for food. Their food consists of carrion, but in the absence of an abundance they attack sheep, deer, goats, and other small animals. Their mode of attack is to dart against the eyes of their prey and seek to inflict mortal wounds by means of the beak. When opportunity occurs they gorge themselves with carrion and are then easily caught by the Indians and hunters. The *king vulture* is closely allied to the condor and is found in the warmer parts of America. This bird has a reddish plumage above and white beneath, with a bluish-gray ruff and a black tail. It attains to about the size of a goose. The condor and birds of this genus have no voice; the only sound given out is a sort of snorting.

CONE, a solid figure that tapers uniformly from a circular base to a point. It is a *right cone* when the point lies in the perpendicular from the center of the base, other wise it is an *oblique cone.* Cones are similar when their axes and the diameter of their bases are proportional. In botany the cone is a kind of collective fruit shaped like a mathematical cone. The fruit of the Scotch fir is a cone.

CONEMAUGH FLOOD (kōn'ę-mą), the name of a flood occurring in Johnstown, Penn., on May 31, 1889. A dam was located across the South Fork creek, ten miles above Johnstown, a little above its junction with the Conemaugh River, by means of which the water formed an immense reservoir. The artificial lake was stocked with fish, and its vicinity served as a pleasure and resort district for the people, most of whom were residents of Pittsburg. Heavy rain preceding the flood tended to weaken the dam and it broke on the afternoon of May 31, sweeping everything before it. The loss of life was 2,500; fully 99 entire families were lost. This loss was partly by drowning and partly by burning those who had been blocked in by the timbers, which had caught fire from an overturned stove. The villages below the lake had a total population of about 45,000, and more or less damage was done to them by the great water wave passing down the valley.

CONEY ISLAND (kō'nī), an island in New York, on the southern shore of Long Island, from which it is separated by a narrow tidal inlet. It is from a few hundred feet to nearly a mile wide and has a length from east to west of about five miles. Formerly it was nothing more than an entire sand waste. In 1874 a line of improvements was begun that transformed the district into a highly valuable region. It is lined with handsome summer hotels and concert and bathing houses, and is crowded with visitors the entire summer season. Manhattan Beach is located at the east end, constituting the portion

patronized by the wealthier classes, and is improved by magnificent and expensive hotels and other edifices. Music halls, galleries, and concert pavilions furnish ample accommodation in the way of amusement and entertainment. Several steamboat companies carry passengers at regular intervals and land at tubular iron piers a thousand feet long. The island is joined by several railroad lines to New York City, and elevated and surface railways carry the pleasure seekers to different portions of the island. It was annexed to Brooklyn in 1894 and is now a part of New York City.

CONFEDERATE STATES OF AMERICA (kŏn-fĕd'ĕr-āt), the name applied to the union formed in 1861, when eleven states seceded from the United States. The slave question was for many years the cause of extended political and social discussion, and the election of Abraham Lincoln to the Presidency was the immediate occasion for taking steps to dissolve the Union and establish a separate government in



CONFEDERATE FLAG.

the southern portion of the United States. South Carolina seceded first and led in the movement to dissolve the Union. A convention assembled on Dec. 17, 1860, and three days later a resolution was adopted which declared that the Union previously existing between South Carolina a. d the other states, under the name of the United States of America, was dissolved. Mississippi followed on Jan. 9, 1861, and proposed a convention to form a Southern Confederacy. The convention met at Montgomery, Ala., Feb. 4, with delegates representing six of the seven states that had then seceded. A provisional Constitution was adopted on Feb. 8, with Jefferson Davis, of Mississippi, as provisional President and Alexander H. Stephens, of Georgia, as Vice President.

The permanent Constitution adopted on March 11 set forth the doctrine of State sovereignty and recognized slavery, though it forbade the slave trade. It established free trade, allowed members of the Cabinet to speak before Congress, authorized the President to veto single items in appropriation bills, and forbade the issuance of credit bills. The presidential term was fixed at six years, and the President was not to be reëlected. All the seceded states, including South Carolina, Mississippi, Florida, Alabama, Georgia, Louisiana, and Texas, ratified the Constitution through conventions. Besides these seven states, Virginia, North Carolina, Tennessee, and Arkansas seceded and were admitted into the Confederacy. Richmond was made the permanent seat of government and Davis and Stephens were elected President and Vice President under the Constitution and inaugurated on Feb. 22, 1862. Large powers were given to the President and he was authorized to direct the energetic prosecution of the war. Money was obtained by cotton loans, by treasury notes, and by requisition, while necessary supplies were acquired by every available means. The government secured belligerent rights from most maritime nations, but its independence was never recognized. The spirit entered upon in the war and the alacrity with which the southern people responded to the call to arms demonstrated great bravery and determination to prosecute the cause of the Confederacy. However, the Federal government never recognized its existence and treated its representatives sent to Washington as citizens of the United States. The history of the confederation is limited to the period covered by the Civil War, and the causes immediately leading up to it. It ceased to exist with the surrender of the Confederate army on April 9, 1865, at Appomattox, Va.

About fifty years have passed since the issues of the Civil War divided the nation into two great factions, each contending for what was held to be a sacred cause, a principle in human government worthy to be defended by life itself. The feeling of jealousy and mistrust that separated the two sections in sentiment long after the surrender of Gen. Lee has happily given way to a new era of commercial and political fellowship, a period in which all sections are united in the uplift that makes for the greatness and perpetuity of an intelligent nation. Oratory and editorial comment are now tempered with the spirit of the times, and the discussion of past events and future ambitions is that of a people united in every phase of national life. This is reflected in a recent article of Dr. G. R. Glenn, of the North Georgia Agricultural College, in which he says in part:

"The purpose of the Confederate Constitution was not revolutionary. There was in the instrument no encroachment on the rights of any northern State. All that the southern people asked of the United States was to be allowed

to secede in peace and set up a government that comported with the aims and ideals of the governed. Conservative men on both sides urged a peaceful separation. Men like Mr. Greeley at the north and Mr. Stephens at the south plead for the preservation of the Union and, if that could not be preserved, then for a friendly separation.

"When the President of the Confederate States called for volunteers men came by the thousands to enlist. As we look back now, when about half a century has passed, their daring and courage seem colossal. Who were these men and for what were they to fight? Nine-tenths of them were poor and did not own a slave and certainly they would not engage in a war for the preservation of slavery. The President of the Confederate States said at the beginning of his government that slaves would cease to be property, and Gen. Lee, the head of the army, freed all of his slaves in 1861. The volunteers were offering themselves to their government to defend a Bill of Rights and a Constitution. They were educated to believe that their State governments were their own, and that any encroachments upon their rights to manage their domestic institutions as they saw proper was a violation of a sacred compact. Slavery was to them only one of the incidents in the quarrel. It may have been the occasion; it was not the cause of the separation.

"The Confederacy died, but the cause for which it lived and struggled did not die. A recent writer says: 'So deeply, though silently, have the minds of the American people been impressed by the magnificent struggle of the Confederate soldiers for the right of local self-government that the hold of that right upon the public conscience has steadily increased in many of the northern states. Over and over again, moreover since the war, has the United States Supreme Court affirmed the limitation of the authority of the general government to the powers distinctly delegated, and the reservation to the states of all undelegated power. The prediction is made that the future historian will say that, while the armies of the North saved the Union from dissolution, the armies of the South saved the rights of the states within the Union.'"

About twenty years ago William D. Kelley, known as "Pig Iron" Kelley, said: "The development of the South means the enrichment of the nation." The truth of this expression must be apparent to all who take time to study the amazing progress of the industries and advancement in values in the southern states. Land in Louisiana that sold at 60 cents per acre in 1895 would command $50 at present; the same proportional increase in values is true in practically all the states south, not alone in land, but also in iron-ore property, coal fields, and other mineral interests. In 1860 the valuation of property in the south was $5,200,000,000, and in 1870 it was only $3,000,000,000, but at present it is $7,500,000,000, an increase of more than a hundred per cent. since the close of the war. The southern states dominate the cotton market of the world, receiving from Europe alone more than $400,000,000 per annum for ginned cotton, or more than $1,000,000 for every day in the year. Rice lands have advanced from $12 to $50 per acre; the rice-growing fields of Louisiana and Mississippi are especially prolific. This is true also of the cultivation of other cereals and tobacco, the rearing of domestic animals, and the output of a large variety of products in the manufacturing industry. The following figures for 1890 and 1905 are of interest in studying the growth of industry in the south:

	1890	1915
Number of cotton mills	119	780
Railroad mileage	42,900	60,250
Phosphate mined, tons	510,299	1,875,480
Bales of cotton used	546,330	2,165,150
Pig iron made, tons	2,600,500	3,250,000
Coke produced, tons	2,534,475	6,245,270
Number spindles in cotton mills	1,712,000	9,205,100
Petroleum, barrels	498,632	42,495,802
Coal, tons	21,250,000	70,185,000
Capital invested in cotton-oil mills	$12,800,000	$ 74,600,000
Capital invested in cotton mills	60,000,000	225,000,000
Lumber products, value	90,700,000	250,000,000
Value of exports	306,000,000	555,480,000
Value of cotton crop	390,000,000	680,000,000
Capital invested in manufacturing	659,000,000	1,500,500,000
Value of farm products	773,000,000	1,750,000,000
Value of manufactured products	917,589,000	1,765,000,000
Property assessed	4,510,925,000	6,500,000,000

CONFEDERATE VETERANS, United, a patriotic organization of veterans of the Confederate States, founded in 1889 at New Orleans, La. The society was established to gather and preserve an impartial history of the Civil War, to cherish and cultivate the friendships formed during the conflict, to commemorate the valorous deeds of the dead, and to give aid and support to the widows and orphans. All surviving soldiers and sailors of the Confederate service are eligible to membership. The local organizations are classified in three departments, those of the Army of Tennessee, of northern Virginia, and of the trans-Mississippi. A button with a square miniature Confederate flag is worn in the lapel of the coat. About 1,500 local camps with a membership of about 70,000 comprise the society, which holds a general reunion each year.

CONFEDERATE VETERANS, United Sons of, a patriotic organization founded in 1896 at Richmond, Va. All the male descendants of the veterans who have an honorable military record in the Confederate army or navy are eligible in the society, which is organized in the three departments known as those of northern Virginia, of Tennessee, and of the trans-Mississippi. Local camps are maintained in all the southern states and reunions are held annually, both by the locals and by the departments. The membership is about 10,000. The society purchased Beauvoir, the home of Jef-

ferson Davis, in 1902, and converted it into a home for Confederate Veterans.

CONFEDERATION, Articles of. See **Articles of Confederation.**

CONFUCIUS (kŏn-fū'shĭ-ŭs), Chinese sage, born at Shangping, in the state of Lu, June 19, 551 B. C.; died in 478 B. C. He was the son of a soldier and descended from a good family. His father died when he was three years old, and his mother reared him in comparative poverty. He became inspector of corn markets at the age of seventeen years, married at nineteen, became a teacher at twenty-two, and attained distinction about 517 B. C., when his disciples amounted to thousands. Political commotions caused him to leave Lu, now a considerable part of the province of Shantung, in 516. He became chief magistrate in the town of Chung-tu in the year 500 B. C. His administration was one of wonderful sagacity and he was made superintendent of works, and shortly afterward was elevated to the position of minister of crime in the state of Lu. This place he resigned on account of jealousy manifested by neighboring states, and traveled through several districts teaching and exercising much influence. He returned to Lu in 483 B. C., but refused to hold office, his death occurring five years later.



CONFUCIUS.

Confucius compiled five books called Yih-king, Shu-king, Shi-king, Le-king, and Chun-tsien. Four others were compiled by his disciples, known as Ta-heo, or Great Study; Chung-Yung, or Invariable Mean; Tung-Yu, or Philosophical Dialogues, and the Hi-tse. The writings of Confucius are held canonical by the Chinese, and the four books last mentioned are classed as sacred. As a teacher Confucius is distinguished most consistently in ethics. The golden rule has been deduced from his proverbs. When asked what one word would best govern the conduct of all, he replied: "Is not reciprocity such a word? What you do not want done to yourself do not do to others." Laotze, a contemporary of his, born in 601 B. C., enounced the advanced moral precept of returning good for evil. When Confucius was consulted on the subject by one of his disciples, he rejected it by saying: "What then will you return for good? Recompense injury with justice and return good for good."

He esteemed very highly the obedience of children to their parents and veneration on the part of the people in general to their ancestors. His doctrine led to the notion that the kingdom is a great family, which, under all circumstances, owes passive obedience to its sovereign. In general his teaching is viewed as a system of ethics, politics, and religion. He revived and advocated the Chinese faith instituted within the thousand years preceding the 23d century B. C., in which the king was the officiator. It includes the worship of ancestors and parents and prayers to the dead, but makes no explicit claims for the futurity of the departed. The reward for good is expected during life on earth.

Confucianism became popular with dignitaries and emperors. Temples to its founder are maintained in all market towns. His history, appearance, and teachings are known better than those of any other Chinaman, and his influence on the great race has been the most impressive and lasting.

CONGER, Edwin Hurd, diplomatist, born in Knox County, Illinois, March 7, 1843; died May 18, 1907. In 1862 he graduated from Lombard University, Galesburg, Ill., and four years later completed the course in the Albany Law School. He was in active service during three years of the Civil War, accompanied Sherman on the march from Atlanta to the sea, and attained the brevet of major. Subsequently he removed to Iowa, where he practiced law until 1882, when he was elected state treasurer as a Republican. In 1885-90 he was a member of Congress, but resigned in the latter year to serve as minister to Brazil. He was relieved of this position by the Democrat administration in 1895, but was reappointed to the same place in 1897. President McKinley transferred him to the embassy at Pekin, China, in 1898, where he and his family witnessed the siege of the capital by the allied army in 1900. His administration during the Boxer rising met the warm approval of the American people. In 1905 he was made ambassador to Mexico, but resigned after a brief service.

CONGO (kŏŋ'gō), or **Kongo,** a great river of the Southern Hemisphere, in the equatorial regions of Africa. It was discovered in 1484 by Diego Cam and named Pillar River. Shortly after the Portuguese explored a portion of it and named it Zaire, by which it is still known in some countries. The English explored 175 miles of its lower course in 1816. Livingstone discovered a number of its tributaries in 1868, and Stanley explored and published accounts of it in 1876-77. The upper portions widen into Lakes Moero and Bangweolo, from which the waters flow toward the north, then make a bold sweep toward the northwest, thence toward the southwest, and finally enter the Atlantic Ocean. The principal northern tributaries are the Ubangi and Aruwimi; the southern, the Kassai and Lulongo. It is divided into the upper, middle, and lower parts. The upper portion is navigable for more than a thousand miles by steamers, from Stanley Pool to Stanley Falls; the middle extends from the cataract regions to Stanley Pool, about 260 miles; the lower, from its mouth to the cataract region, 110 miles. The total length of

the river is about 2,550 miles. It ranks as one of the ten great rivers of the world. The volume of water discharged by it is exceeded only by the Amazon.

CONGO FREE STATE, a colony of Belgium, located in Central Africa, containing an area of 900,000 square miles. Its boundary line is not well defined, but may be stated in general to be formed by French Congo on the northwest, German East Africa on the east, British Central Africa on the south, and by Angola and the Atlantic Ocean on the west. It owes its organization to the discoveries of Stanley, carried on largely under the International Association founded at Brussels in 1876, under the presidency of the King of Belgium. An international conference was held in Berlin in 1885, at which certain rights and privileges, such as free trade and international navigation, were guaranteed to the principal nations. The state was placed under the sovereignty of Leopold II., King of Belgium, who had contributed largely to the exploration and opening of the Congo district. By a treaty made in 1890 the king conveyed his rights to Belgium with the privilege of annexing it in the year 1900. . Much dissatisfaction among the inhabitants was reported in 1907, owing to atrocities practiced by the authorities upon the natives.

The Congo region includes the principal part of the basin of the Congo River. It is exceedingly fertile and includes many valuable mineral and agricultural districts. The river system affords no less than 6,000 miles of navigation facilities, while a railroad line has been built from the ocean to Leopoldville, a point immediately above the cataract. Its interior and foreign trade is fast developing under twenty-five commercial companies, representing a capital of about $25,000,000. The principal products and exports consist of caoutchouc, ivory, wax, copra, coffee, cotton, fruits, sugar, and many others of value commercially. The principal minerals include gold, lead, iron, copper, and coal. It has extensive forests, yielding valuable wood, India rubber, palm oil, nuts, and palm kernels. A majority of the trade is with Belgium, Germany, Great Britain, France, and Holland. Manufactures have been developed by means of excellent water power from the numerous falls and cataracts of its rivers, and several important railroad lines have been built. Among the lakes are Moero and Leopold.

The government is administered by the King of Belgium, who is assisted in the affairs of the state by two ministers. A governor general at Boma represents the government in the state. The principal cities are Boma, on the Congo, which is the capital, Leopoldville and Equatorville. The last mentioned is located at the junction of the Bosira and the Congo rivers, under the Equator. Numerous other trading points have been developed from Belgium, under a commission, of which the king is the chief officer. The natives are peaceable and considerably advanced in civilization and industrial arts. They are chiefly of the Bantu race. The European population does not exceed 6,000, of which about two-thirds are Belgians. The total population is estimated at 15,000,000.

CONGREGATIONALISTS (kŏn-grē-gā'-shŭn-ăl-ĭsts), a body of Christian churches, most largely organized in England and the United States. The doctrine of these churches does not differ essentially from the other Protestant denominations, but in government they occupy a vastly different field. Each congregation has independent power of self-government, uncontrolled by any bishop, presbytery, or other external ecclesiastical authority. Deacons are subordinate rulers and ministers are recognized, but the congregation itself decides upon its membership and disciplinary power. They believe their form of government to be of divine authority, and to have been that of the apostolic churches. This view is rejected by the Presbyterian, Episcopal and various other churches, most of which claim similar descendency.

Among the first advocates of a system of government similar to modern Congregationalism was Robert Brown, born in the middle of the 16th century. He was a preacher, schoolmaster, and lecturer, and led a party in opposition to the constitution of the Established Church. He set up a congregation in London about the year 1593, when the number of his followers was estimated at about 20,000. Owing to opposition against the leaders, especially on the part of the Established Church of England, he was compelled to remove to Holland, where several churches were organized. The history of this movement is an interesting one and connects Oliver Cromwell and his soldiers with the followers, then called *Dissenters* or *Independents.* After vainly petitioning for religious freedom, they became alienated from Parliament and the Presbyterians. From this time on they grew rapidly in numbers, and now constitute the third English denomination. In the United States they rank as eighth in number. An international council was held in Boston in 1899, the second in the history of the denomination, at which it was decided to establish extensive missions for Cuba and Porto Rico. This denomination has 5,850 ministers, 5,760 churches, and 784,500 members in the United States. Their institutions of learning include thirty, with more than 500 professors, 6,575 students, and an endowment fund aggregating about $10,000,000. In Canada and Newfoundland they have 155 churches and 18,580 members.

CONGRESS (kŏn'grĕs), a formal meeting of persons regarded as representatives of a society or country for deliberation and discussion. The term is especially applied in political affairs to assemblies or conferences and to the legislative authorities of many nations. It is the name given to the legislative branch of the government of the United States, and in history is

attached to three different bodies. The first was the Colonial Congress, which met in New York on Oct. 7, 1765, and was constituted of delegates from nine colonies. All the colonies except Georgia were represented in a similar congress at Philadelphia July 5, 1774, and declared certain rights. This body became known as the Continental Congress, and adopted the Declaration of Independence on July 4, 1776. The next Congress was the one organized under the Articles of Confederation. It met for the first time on March 2, 1781, and was succeeded by similar assemblies until March 4, 1789, when the Constitution went into effect. The first Congress under the Constitution met in New York in 1789, then the capital. Its meetings were held at Philadelphia from 1789 until 1800, when the capital was moved to Washington.

The Congress of the United States consists of a *Senate* and a *House of Representatives,* in which the legislative authority of the United States is vested, under the supervision of the veto power granted to the President. It has power to lay and collect taxes, duties, imposts, and excises; to borrow money; to regulate commerce; to coin money; to constitute judicial tribunals; to declare war; to provide and maintain a navy; to grant letters of marque and reprisal; to raise and support armies; to provide for the calling forth of military forces; and to admit new states into the Union. Among the provisions common to both houses are the power to judge of the election and qualification of its members, to compel the attendance of members, and to determine the rules of its proceedings. Each may punish and expel members with the consent of two-thirds. A *quorum* of each is constituted of a *majority,* the presence of which is required to transact business. Neither body can adjourn for more than three days without the consent of the other, nor to any other than the usual place of meeting. The salary is $7,500 per annum, payable monthly out of the treasury, and an allowance of twenty cents for each mile traveled by a usual route. The meetings of Congress occur on the first Monday in December of each year, but this time may be changed by law, and the President may convene the Congress in an extra session.

The first Senate consisted of 26 members. It is constituted of 96 members at present. Two senators are chosen by the Legislature of each state, for a term of six years. The qualifications are: age, thirty years; citizenship, nine years; and inhabitancy in the State in which chosen. The senators are divided into three classes, one-third going out of office every two years. They may be reëlected for an indefinite number of terms. The Senate has concurrent legislative powers with the House, and, besides, has power to confirm appointments made by the President and to consent to treaties. In it is vested the power to elect the Vice President, in case the electoral college fails to make a choice. This occurred only in 1837, when Richard M. Johnson was elected Vice President. It is also a court of impeachment, having power to try those impeached by the House. The Vice President is the presiding officer, besides whom a president pro tem. is chosen by the body.

The House of Representatives is made up of members elected by the voters of the several states, the representation being based upon the population in accordance with the national census taken every ten years. The representation in the first Congress was based on 30,000 inhabitants, the membership consisting of 65. In 1911 Congress fixed the number at 435, an increase of 49 members over the basis of 1910. Each State is entitled to at least one representative. The conditions of eligibility are: age, twenty-five years; citizenship, seven years; and inhabitancy of the State from which they are chosen. The election is held in the even-numbered years, and the term is for two years. Each Territory is represented in the House by a delegate, who may speak on any question, but cannot vote.

Besides having concurrent legislative powers with the Senate, the House has original and exclusive power to originate bills for raising revenues. It has power to impeach officers of the United States, and to elect a President in cases where the electoral college fails to make a choice. This occurred but twice; in 1801, when Jefferson was elected, and in 1825, when John Quincy Adams was chosen. The speaker and the officers of the House are chosen from the members by a general vote. The House more particularly represents the people than does the Senate, while the Senate represents more particularly the states. The plan of electing the Senators was proposed in deference to the view held, in the early history of this country, that states have certain rights greater than the nation, and which were not relinquished to the nation at the time of forming the Union. There is a large class of voters that hold to the advisability of electing both the representatives and Senators by popular vote of the people.

CONGRESSIONAL LIBRARY. See **Library of Congress.**

CONGRESSIONAL RECORD, the printed proceedings of the United States Congress. In the early history of the republic, up to 1799, the Senate held its sessions with closed doors and no journal of its proceedings was published, but since that time the record is printed daily. It cannot be said that the Congressional Record is an authentic publication, since members are permitted to revise their speeches after they appear in type, and they are also permitted to have remarks and speeches inserted that were not delivered in session. From 1789 to 1824 the journal was called the *Annals of Congress;* from 1825 to 1837, the *Register of Debates;* and from 1837 to 1874, the *Congressional Globe.*

CONGREVE (kŏn′grēv), **William,** dramatist, born at Bradsey, England, in 1670; died Jan.

19, 1729. He studied at Trinity College, Dublin, and returned to England for the study of law at the Middle Temple, but did not take up the practice. In 1693 he published "The Old Bachelor," which was dramatized and performed successfully at Drury Lane. His writings are characterized by a sustained flow of wit, but are marred somewhat by the eccentricities and loose morality of the author. They include "The Double Dealer," "Love for Love," "The Mourning Bride," and "The Way of the World."

CONIFERAE (kō-nĭf'ĕr-ē), an important order of plants, including the fir, yew, pine, cypress, larch, juniper, etc. Trees of this group are most abundant in the temperate zones and are very sparsely represented in the tropics. Most of the species have a central shaft extending almost to the top, while the branches grow



LARCH.

A, twig with flowers; *B*, same with cones.

horizontally and diminish upward, thus giving the tree a conical outline. The leaves are slender and firm, well constructed to endure cold, but are not formed to supply choice foliage. In some of the conifers the leaves are flat and broad and in others they consist of disklike portions that appress and overlap each other, as in the arbor vitae.

Most species of the Coniferae are *evergreen*, that is they have no regular period of shedding their leaves, which fall from time to time as new growths take their place. To this there are some exceptions, such as the larch, or tamarack, which sheds its leaves annually. The fruit, which in most species is a cone formed of heavy scales, contains a number of seeds. The scales lie firmly against each other until the seeds ripen, when they open and the seed is carried away by the wind. In this class of conifers the seed is fertilized by a yellowish pollen, which becomes effective at the time the seed escapes. Some of the species produce berries, such as the junipers. These and the pines are widely distributed, but the bald cypress and sequoia are greatly restricted. Many fossil conifers occur in good preservation in all the geologic formations from the middle Devonian to the most recent.

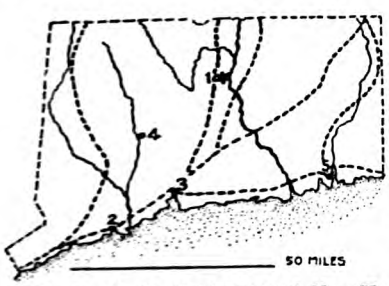
CONJUNCTION (kŏn-jŭnk'shŭn), in astronomy, the position of a planet when it is in the same straight line with the earth and the sun. It is said to be *inferior* when between the earth and the sun, and the conjunction is called *superior* when the planet is outside the earth so the latter is the central body, or is beyond the sun so the latter is between the earth and the planet. The three bodies are never in a truly straight line, on account of the inclination of the planes of the several orbits. When several stars or planets are found together they are said to be in *grand conjunction*. These are of course extremely rare, but such a conjunction, according to Chinese history, is said to have occurred about 2430 B. C., in the reign of Tehuen-hiu. A conjunction of the moon, earth, and sun is called an *eclipse*.

CONKLING (kŏnk'lĭng), **Roscoe,** statesman, born in Albany, N. Y., Oct. 30, 1829; died in New York City, April 18, 1888. He was the son of Alfred Conkling, who served in Congress from 1821 to 1823 and was minister to Mexico in 1852. He received an education in an academy, studied law at Utica, and was admitted to the bar in 1849. The following year he became district attorney for Oneida County and was elected mayor of Utica in 1858. He was elected to Congress by the Republicans in the same year, reëlected in 1860, defeated in 1862, but reëlected in 1864 and 1866. In 1867 he was elected to the United States Senate and was reëlected in 1873 and 1879. While in Congress he served on many of the important committees, supported the fourteenth amendment to the Constitution, advocated the prosecution of the Civil War, and attacked the generalship of McClellan. He ranked as a strong opponent to James G. Blaine, and was a leading factor in his defeat for the Presidency in 1884. His name was presented in 1876 as a candidate for President, and ninety-three votes were cast in his favor. He organized the Stalwart faction in opposition to President Hayes, who had adopted a mild policy toward the South, and was hostile toward President Garfield on account of a question of appointment to office. In 1881 he and his associate, Thomas C. Platt, sought to control the Federal appointment in his State, and resigned their seats in the Senate with an appeal to the New York Legislature for a reëlection as a

personal vindication. This proved unsuccessful and he resumed the practice of law in New York City. In 1884 he advocated the nomination of Gen. Grant for President and made the nominating speech in the Chicago convention. When President Arthur offered him the nomination of justice of the United States Supreme Court, he declined. His record as a speaker, thinker, and advocate takes high rank among American citizens, and his personal following and friendship has rarely been exceeded.

CONNEAUT (kŏn-nē-ạt'), a town of Ashtabula County, Ohio, in the northeastern corner of the State, on Lake Erie, and on the Lake Shore and Michigan Southern and other railroads. It has steamboat facilities and a considerable trade in coal and farm produce. Near the town, at the mouth of Conneaut Creek, is a lighthouse. The manufactures include brick, canned goods, and machinery. It is one of the oldest towns in Ohio, having been settled in 1796, and was incorporated in 1832. Population, 1900, 7,133; in 1910, 8,319.

CONNECTICUT (kŏn-nĕt'ĭ-kŭt), one of the original thirteen states of the United States, known popularly as the Nutmeg State. It is included between latitudes 40°59′ and 42°3′ north and longitude 71° 47′ and 70°43′ west. The boundary on the north is formed by Massachusetts, east by Rhode Island, south by Long Island Sound, and west by New York. Its greatest length from east to west is about 104 miles and its greatest breadth is 76 miles, with an average width of 57 miles. The total area is 4,990 square miles, which includes a water surface of 145 square miles. It is the third smallest State in the Union, but in population holds twenty-ninth rank.



1, Hartford; 2, Bridgeport; 3, New Haven; 4, Waterbury; 5, New London. Chief railroads shown by dotted lines.

DESCRIPTION. The surface of Connecticut is diversified, but it is not greatly elevated above the sea at any point. In the northern section are the highest elevations, where the highland region extends into the State from Vermont, and the surface slopes gradually toward the south. The Berkshire Hills, which extend from the Green Mountains of Vermont into Massachusetts, traverse the northwestern part of the State. In the eastern part the hills are rounded and fertile and in the northwestern section they are often broken and precipitous, with bold bluffs of trap rock. Bear Mountain, the highest elevation, is 2,355 feet above the sea. Other summits include Girdley Mountain, Prospect Mountain, Riga Mountain, and Ivy Mountain. Level plains extend along the streams, and much of the country adjacent to Long Island Sound is level or characterized by low hills.

The principal river is the Connecticut, which crosses from north to south through the center of the State. Three river systems furnish practically all of the drainage, the Thames and its tributaries in the eastern portion, the Connecticut in the central part, and the Housatonic in the western section, and all of them flow into Long Island Sound. The Pawcatuck forms part of the boundary between Connecticut and Rhode Island, the Shepaug is a tributary of the Housatonic, the Farmington is an affluent of the Connecticut, and the Saugatuck drains the larger part of Fairfield County. Many of the streams flow through formations of solid rock and in the highlands the courses are cut deeply. In most places they furnish valuable water power.

The climate of Connecticut is quite uniform, ranging from a mean temperature of 28° in winter to about 68° in summer. In winter the temperature falls frequently as low as 10° to 15° below zero, while the extreme heat of summer ranges from 90° to 100°. Heavy snows fall among the hills and mountains, where the winters are quite severe and of long duration, but the summers are pleasant and all seasons of the year are healthful. The mean annual rainfall is about 52 inches and the precipitation is quite evenly distributed. In the highlands the soil is thin and in some places barren, but it is of value in growing grasses and fruits. The valleys and the southwestern part have a dark soil of much fertility. Fine forests abound along the Connecticut and other streams, and include pine, hickory, walnut, wild cherry, oak, and maple.

MINING. Iron ore has been mined since 1732, but the output is not important as compared to the production in Missouri and Minnesota. Tungsten ore is mined near Long Hill and deposits of lead, copper, and nickel are known to occur. Granite is the most abundant of the minerals and is quarried extensively for monuments and building purposes. Large quarries of brownstone are worked at Portland and near Middletown. Limestone, clay, and cobalt are obtained in various localities.

AGRICULTURE. Farming is confined largely to the valleys of the rivers, where the soil is mostly fertile, but the hills and highlands are generally broken and stony. Hay is the most extensive crop and is cultivated on an area about three times as large as that utilized in growing all other crops. Tobacco has been an important product since 1640, and is grown chiefly in the valleys of the Connecticut and Housatonic rivers. Vegetables of all kinds thrive abundantly and large interests are devoted to the culture of fruit, especially apples and peaches. All of the

cereals can be grown profitably, especially rye, corn, wheat, buckwheat, and oats, but there has been a steady decline on account of more profitable development in other lines, especially dairy and vegetable farming. The dairy products include milk, butter, and cheese, and a ready market is found in New York and other commercial centers of the East. Swine, sheep, and horses are grown, but dairy cows receive the greater share of attention.

MANUFACTURING. Manufacturing is the leading industry, in which about twenty per cent. of the people are engaged. The State ranks eleventh in the output of manufactures. About three-fourths of the total ammunition made in the United States comes from Connecticut. The State produces forty per cent. of the hardware, fifty-six per cent. of brass manufactures, sixty-three per cent. of the clocks, sixty-four per cent. of the pins and needles, seventy-six per cent. of the plated ware, and a large proportion of the rubber goods and textile fabrics produced in the United States. In the output of its fisheries it takes third rank among the New England states. A large share of the output is shipped fresh to market, but much interest is shown in curing and canning. Oyster fishing is the largest of the fishing industries and next in order are the lobster, cod, and menhaden fisheries.

COMMERCE AND TRANSPORTATION. The export trade of Connecticut is largely through the port of New York City, but foreign imports are entered direct at Hartford, Stonington, Fairfield, New Haven, and New London, all of which are ports of entry. Transportation facilities are furnished by the Connecticut River, which is navigable for large steamers to Hartford, about fifty miles, and river boats ascend to Holyoke by means of the Windsor Locks. Railroad building received attention at an early date, hence few extensions were made within recent years. The lines include a total of 2,050 miles, most of which are controlled by the New York, New Haven and Hartford Company. The State has a large number of finely improved highways and many electric urban and interurban railways are in successful operation. Safe and commodious harbors are furnished by the numerous inlets on the coast.

EDUCATION. The State has long occupied a foremost position in the educational field, and elementary education was provided at public expense from the earliest Colonial period. About five-sixths of all persons of school age attend the public schools, while a nominal compulsory attendance law requires registration in some schools between the ages of four and sixteen. The general supervision and control of the educational interests are intrusted to the State board of education, and local administration is vested in a town committee or a board of education. Support is given jointly by local taxation and by income from the State school fund. Normal schools are located at New Haven and Willimantic.

Connecticut has no State university, but is well provided with representative institutions of higher learning. Yale University, one of the leading institutions of higher learning in America, is located at New Haven. Trinity College at Hartford, Wesleyan University at Middletown, and the Hartford Theological Seminary are among the chief educational centers. An agricultural college is located at Mansfield. A hospital for the insane at Middletown, a State prison at Wethersfield, a school for the feeble-minded at Lakeville, training schools for nurses at Hartford and New Haven, an industrial school for girls at Middletown, and an industrial school for boys at Meriden are among the benevolent and reformatory institutions.

GOVERNMENT. The present constitution was adopted in 1818 and has been enlarged by thirty-one amendments. It requires that those who vote must be able to read and write and have resided in the State one year and in the town six months. Executive authority is vested in the governor, lieutenant governor, secretary, treasurer, and comptroller, each elected for two years. A majority vote of each branch of the Legislature is necessary to overcome the veto of the Governor. The Senate consists of thirty-five members and the House of 255 members, both senators and representatives being elected for two years. Regular sessions of the General Assembly, as the Legislature is called, are held biennially, in even years, beginning on the first Tuesday after the first Monday in November. A chief justice and four associate judges constitute the supreme court of errors. Other courts include a superior court of six judges, the courts of common pleas, district courts, and justices of the peace. Local government is administered by the towns and counties.

INHABITANTS. The population of the State has shown a steady and uniform growth the past two decades, owing largely to the increase in the demand for labor in manufacturing enterprises. Nearly sixty per cent. of the people reside in cities of over 8,000 population. Immigration has been chiefly from Ireland, Germany, England, and Canada in the order named. Hartford, the capital, is located on the Connecticut River. The leading cities include Bridgeport, New Haven, Waterbury, New London, Meriden, New Britain, Norwalk, Danbury, Norwich, Stamford, Ansonia, Middletown, Willimantic, Rockville, and Bristol. The total population in 1900 was 908,420; in 1910, 1,114,756.

HISTORY. The history of Connecticut is closely linked with the entire period since the early settlement of America. It was inhabited originally by Indians numbering about 20,000, the most numerous being the Pequots. The first settlement was made by the Dutch near Hartford in 1633. Two years before that date a grant had been given to Lord Say and Sele for a

tract of land extending from Narragansett Bay to the Pacific Ocean. However, this grant, though made by the Earl of Warwick, was not considered legal, but the town of Saybrook was founded under it in 1635. In the meantime a number of emigrants from Massachusetts Bay settled at Wethersfield and Hartford, and New Haven was founded by English Puritans in 1638. The Dutch relinquished their possessions in 1650, and New Haven was annexed to Connecticut in 1662. John Winthrop, Jr., had previously obtained a liberal charter from Charles II., who granted absolute autonomy to the colony, but it was demanded by Sir Edmund Andros in 1687 and was secreted until 1689. In 1708 the Congregational Church was established and secular and religious affairs were long closely associated, but all other denominations were tolerated.

Connecticut furnished about 30,000 men for the Continental army in the American Revolution, and was raided a number of times during the conflict. It was the fifth State to ratify the United States Constitution, in 1788, and strongly opposed the War of 1812, when the celebrated Hartford Convention met in its capitol. The present constitution was adopted in 1818, by the terms of which slavery was abolished. The State furnished 56,000 men for the Federal army in the Civil War, and Buckingham, the war Governor, was a prominent figure of that period. Hartford and New Haven were jointly the capitals until 1873, when the former was made the sole seat of government.

CONNECTICUT RIVER, the longest river in New England, rises in northern New Hampshire, forms the boundary between it and Vermont, flows through Massachusetts and Connecticut, and enters Long Island Sound at Saybrook. It is about 375 miles long and drains and area of about 11,250 square miles. Large steamers ascend to Hartford, a distance of fifty miles, and it is navigable to Holyoke for river boats by means of the Windsor Locks. It furnishes an abundance of water power and has a number of falls, including those at Olcott, 36 feet; Bellow's Falls, 55 feet; Turner's, 41 feet, and Holyoke, 59 feet. The White, Passumpsic, Chickopee, Farmington, and Salmon rivers are its principal tributaries. On its banks are many important towns and it carries a large inland trade.

CONNECTIVE TISSUE (kŏn-nĕk'tĭv), one of the elementary tissues of animals, found in nearly all parts of the body. It originates in the middle layer of the embryo, and includes the adipose, areolar, cartilaginous, osseous, retiform, white fibrous, and yellow elastic connective tissues. *Adipose tissue* is most abundant at the kidneys and under the skin, but is found in most parts of the body. It is penetrated by blood vessels, but the fatty parts do not have the termini of nerve fibers. *Areolar tissue* consists of fine fibers which interlace each other, is widely distributed in the body, and sheathes the nerves, glands, and muscles. *Cartilaginous tissue* furnishes the attachments for ligaments and muscles, incloses the larynx and trachea, and joins the bones to each other. *Osseous tissue* is the chief constituent of the bones. *Retiform tissue* is composed of crossing lines and interstices and serves chiefly in the attachments of organs, such as the retiform coat of the eye. *White fibrous tissue* makes up the ligaments around joints, the tendons of muscles, and the sclerotic coat of the eye, and is found in the pericardium and the periosteum. It varies materially in the number of cells and fibers, and in the main consists of parallel bundles which branch as the connections are made. *Yellow elastic tissue* consists of large and coarse fibers and is very elastic. It occurs in the trachea, veins, skin, and vocal cords. *Neuroglia tissue* is the connective tissue of the nervous system.

CONNELLSVILLE (kŏn'nĕlz-vĭl), a borough of Fayette County, Pennsylvania, on the Youghiogheny River, fifty-four miles southeast of Pittsburg. It is on the Pennsylvania and the Baltimore and Ohio railroads. Among the noteworthy buildings are the public library, the high school, and a State hospital. The surrounding country has gas and coal deposits and fertile agricultural lands. The products of its industries include flour, tin, brick, hardware, machinery, and railroad cars. About one-half of the coke made in the United States is produced here. It was first settled by Zachariah Connell in 1770 and became a borough in 1806. It has a good trade and modern improvements. Population, 1900, 7,160; in 1910, 12,845.

CONNERSVILLE (kŏn'nĕrs-vĭl), county seat of Fayette County, Indiana, sixty-five miles northwest of Cincinnati, Ohio, on the White Water River and on the Cincinnati, Hamilton and Dayton and other railroads. The chief buildings include the courthouse, the public library, and the high school. It is surrounded by a fertile fruit growing and farming country. The leading industries are machine shops, flouring mills, iron foundries, and planing mills. It has a considerable trade in merchandise. Waterworks, sewerage, and electric lighting are among the public utilities. It was incorporated in 1813. Population, 1900, 6,836; in 1910, 7,738.

CONON, an Athenian general, who lived about 400 B. C. He had command of a fleet of eighteen vessels in 413 and prevented the Corinthians from sending aid to Syracuse, which was then at war with Athens. He was elected general in connection with Alcibiades in 409 and succeeded him three years later. In 394 he commanded the combined fleets of Athens and Persia which defeated the Spartans at Cnidus. Afterward he rebuilt the Long Walls of Athens.

CONSCIENCE (kŏn'shẹns), the feeling that enables us to distinguish right from wrong in character and conduct, which commends us when we obey and condemns us when we dis-

obey it. A right conscience is the result of wholesome teaching, and is strengthened by wise exercise and use.

CONSCIOUSNESS (kŏn'shŭs-nĕs), the power that the mind has to know its own actions and states. It implies the state of being aware of one's own existence and of one's mental acts and states. Consciousness differs materially in different persons, some possessing much greater powers of consciousness. It is not under the control of the will. We can be conscious only of thinking, willing, and feeling; of acts and states, as remembering, choosing, and perceiving; and the products of these actions—our thoughts, concepts, feelings, etc.

CONSERVATIVES (kŏn-sĕrv'ă-tĭvz), a political party of Great Britain. It is nominally the successor of the Tory party, and in leading issues stands opposed to the Liberals. The name was first used about 1832, when a large number of citizens favored the Reform Act of that year, and as compared to the Tories its members were generally classed as more liberal. Balfour and Chamberlain are the chief leaders of the Conservatives in recent years. The leading political parties of Canada are the Liberals and the Conservatives.

CONSERVATORY (kŏn-sĕrv'ă-tō-rў), an institution organized to give public instruction in and promote the study of music. Conservatories are of ancient origin and were first established in connection with religious societies for the purpose of improving the character of church music. Originally they were charity schools and were recruited by orphans and foundlings of both sexes. Giovanni di Tappia founded the first famous conservatory in Naples, Italy, in 1537. The Paris Conservatory of Music was established in 1784 and takes rank as the most noted institution of the kind in France. Mendelssohn founded the famous Conservatorium at Liepzig in 1842, and it still takes rank as the leading institution of that class in Germany. Five noted conservatories are maintained in England, of which the Royal Academy of Music, founded in 1822 at London, is the most important. Many institutions of this kind are maintained in Canada and the United States. Those of the former country are represented in Montreal and Toronto. The chief conservatories of the United States include the Peabody Institute at Baltimore, the National Conservatory in New York, the New England Conservatory in Boston, and the Cincinnati College of Music.

CONSHOHOCKEN (kŏn-shō-hŏk'ẹn), a borough in Montgomery County, Pennsylvania, on the Schuylkill River, twelve miles northwest of Philadelphia. It is on the Pennsylvania and the Philadelphia and Reading railroads. The chief buildings include the public library and a number of churches and public schools. It has manufactures of cotton goods, flour, ironware, machinery, surgical instruments, and earthenware. Electric lighting and water works are among the improvements. The surrounding country is agricultural. It was founded in 1830 and incorporated in 1852. Population, 1900, 5,762; in 1910, 7,480.

CONSONANT (kŏn'sō-nạnt), a letter of the alphabet which cannot be sounded, or but imperfectly, by itself, and only perfectly in conjunction with a vowel. Consonants are divided into *mutes* and *spirants*. Mutes are sounds in the production of which the breath is stopped or checked, as *b* and *p*. Spirants are produced with a partial stoppage of the breath, as in *v* and *f*. A consonant sound differs from a vowel in that it is produced by an obstruction to the breath, while the vowel sound is produced by a continuous passage of the breath.

CONSPIRACY (kŏn-spĭr'ă-sў), in criminal law, a combination of two or more persons, by one concerted action, to accomplish some criminal or unlawful purpose, or to accomplish some purpose, not in itself criminal or unlawful, by criminal or unlawful means. Conspiracies of various kinds are defined and their punishments are fixed by the laws of all nations. The grade of punishment differs according to the nature of the intent on the part of the persons who form the conspiracy.

CONSTABLE (kŭn'stă-b'l), **Archibald,** publisher, born in Fifeshire, Scotland, Feb. 24, 1774; died July 21, 1827. He attended the parish school and was apprenticed to a bookseller in Edinburgh, where he became interested in the purchase of rare works. In 1795 he commenced business on his own account as a bookseller. He became proprietor of the *Edinburgh Review,* in 1802, and the same year commenced publishing a large portion of the poems and novels of Sir Walter Scott. About the same time he became owner of the "Encyclopaedia Britannica," which he enlarged by publishing several supplements. In 1826 his firm failed and entailed great loss upon Scott. He published "Memoir of George Heriot."

CONSTABLE, John, landscape painter, born in Suffolkshire, England, June 11, 1776; died April 1, 1837. He studied in the Royal Academy of London, after having made a number of exhibits of landscape paintings. In 1829 he was made a Royal Academician and his productions became recognized on the continent. His famous paintings entitled the "Cornfield," "Valley Farm," and "Barnes Common" are in the National Gallery in London. "The Cottage," "Glebe Farm," and "Weymouth Bay" are in the Louvre in Paris. He published a finely illustrated work entitled "English Landscape Scenery." His "Salisbury from the Meadows" is highly prized. In 1836 he delivered a course of lectures at the Royal Institution.

CONSTANCE (kŏn'stạns), **Lake,** a fine sheet of water located between Germany and Switzerland, about 1,295 feet above the sea. The Rhine flows through it from east to west,

a distance of forty-three miles. It is about eight miles wide and 960 feet deep, and covers an area of 208 square miles. It is surrounded by beautiful vineyards, orchards, wooded hills, and picturesque castles. There are fine fisheries of salmon, trout, and shellfish. Railroad lines connect its towns in all directions, while steamboats ply upon its surface. It is remarkable for beauty and much sought as a pleasure and health resort.

CONSTANT (kŏn-stŏn'), **Jean Joseph Benjamin,** painter, born in Paris, France, June 10, 1845; died May 26, 1902. He studied in the Ecole des Beaux Arts, and exhibited his first great productions at the Salon in 1869. He gained a reputation as one of the most popular of recent French painters. His works won many medals and the Legion of Honor, and he was awarded several prizes at the Columbian Exposition in 1893. Among his most famous productions are "Hamlet and the King," "Favorite of the Emir," "Mahomet II.," "Prisoners in Morocco," and "Day After a Victory in the Alhambra." His painting, "Hamlet and the King," was purchased by the French government at a favorable price.

CONSTANTINE I. (kŏn'stạn-tīn), **Flavius Valerius Aurelius,** called the Great, born in February, 272 A. D.; died July 22, 337. He was the eldest son of Constantius Chlorus, and distinguished himself when but twenty-two years old as a soldier in the expedition to Egypt and Persia. Constantius and Galerius became emperors in 305 respectively of the West and East. Constantine served in the Eastern Empire under Galerius, but, owing to extensive exposure in the East, he joined his father at Boulogne as the latter was entering upon his expedition against the Picts in North Britain.



CONSTANTINE I.

Constantine succeeded his father as emperor in 306. Soon after he was opposed by two rivals, Maximian and Maxentius, father and son. The son, owing to a quarrel, forced his father to flee to Rome, who took refuge with Constantine, but afterward he fled from Rome on account of a conspiracy and was captured and executed. Maxentius, greatly angered at the death of his father, collected a vast army and threatened Gaul. Constantine hastened to meet him, crossed the Alps by Mont Cenis, and defeated him three times. In the last engagement Maxentius was drowned in an attempt to escape across the Tiber. Soon after Constantine entered Rome in triumph, adopted a vigorous military policy, and quieted public excitement. He was now sole emperor of the West, and Licinius became emperor of the East about the same time. In 314 the two emperors became engaged in war, which terminated to the advantage of Constantine. Peace was soon concluded, the conditions being the cession of Greece and other territory to Constantine. He next devoted himself to the correction of abuses and public extravagance, strengthened his frontier, effected internal improvements, and established himself as a powerful military influence.

In 323 a war broke out between the West and East, and terminated in Constantine becoming sole ruler of the Roman world. The capital was now moved from Rome to Byzantium, which was solemnly inaugurated as the seat of government in 330 under the name of Constantinople. A dark shadow was thrown over his memory in 324 by the execution of his gallant and accomplished son, Crispus, along with some others on a charge of treason. The council of Nice met in 325 and was supported by Constantine. Subsequently he granted toleration to the Christians and had Christianity adopted as the state religion, at the same time closing pagan temples and forbidding sacrifices. Shortly before his death he professed Christianity and allowed himself to be baptized. He ranks high as an emperor, being beloved by his people and moderate toward other nations. The efficient organization of a stable government and the adoption of Christianity in his vast dominion are the chief events of his life.

CONSTANTINE, Paulovitch, Russian grand duke, born May 8, 1779; died June 27, 1831. He was the second son of Emperor Paul I., who exercised much concern for his military and general education, and he early distinguished himself by activity and ability. He rendered valuable service at Austerlitz in 1805, and subsequently attended his brother, Emperor Alexander, on all his noted campaigns against Napoleon. The government of Poland was intrusted to him by his brother after the congress of Vienna. He resigned his claims to the throne of Russia in January, 1822, and refused to serve when proclaimed emperor in Saint Petersburg in 1825. The throne then fell to his younger brother, Nicholas. When the French Revolution of 1830 broke out, he was obliged to flee for his life, but later returned with the approval of the nation.

CONSTANTINE I., King of Greece. See **George I.**

CONSTANTINOPLE (kŏn-stăn-tĭ-nō'p'l), called Stamboul by the Turks, the most celebrated city of Turkey in Europe and the capital of the Turkish Empire. It occupies an advantageous site on the Bosporus, having the Golden Horn, an inlet to the Sea of Marmora, on the north, which affords ample anchorage and facilities for innumerable ships.

Constantinople occupies such an important position in warfare, commerce, and trade that its possession is regarded an international advantage. Its occupation is sufficiently potent to disturb the balance of power in Europe. The site is hilly and undulating. It is beautified by numerous mosques, palaces, cypress groves, monuments, gardens, and towers. The beauty of the Thracian Bosporus is almost unrivaled. Among its most noted edifices is the Mosque of Saint Sophia, a fine example of Byzantine architecture, which was converted from a Christian church into a mosque by the Turks. The Mosque of Soliman and the Mosque of the Sultana Valide, built by the mother of Mohammed IV., are imposing structures. The palace or Seraglio of the Sultan occupies the extreme portion of the promontory on which the city is located. It and its surroundings consist of pavilions, beautiful gardens, and parks which occupy a large tract. The principal entrance to the palace is a lofty gate called the Bab Humayum, or *sublime porte,* from which the generally known diplomatic phrase originated. Fully 300 mosques are maintained in the city. Many other Turkish and Eastern edifices are distributed throughout various portions of the city, and it has an Oriental instead of an Occidental appearance.

The commerce of the city is very extensive both by navigation and inland communication. Railroad connections have been made with many of the principal European cities and with portions of Asia through Asia Minor. The trade is largely in the hands of Greeks, Germans, Austrians, Italians, French, and British. The educational interests are greatly inferior to those found farther toward the northwest in Europe, but some degree of elementary education is given, while several higher institutions of learning are under the control of the Porte. An institution for medical research is conducted by Germans, while several other higher institutions disseminate knowledge in law, philosophy, commerce, and industrial arts. Both Turkish and Greek public libraries are maintained, and several periodicals are published in the Turkish and European languages. Many portions of the city have narrow streets, covered with filth, and there are large areas with miserable houses of wood and clay. Among the newer improvements are electric and gas lights, pavements, rapid transit, and a telephone system. The Crimean War and several great fires did much damage to the older portions of the city, which resulted in improvements and buildings on a more modern European style. The language spoken is Turkish, with Greek and other languages in isolated portions. Mohammedanism is the chief religion, but there are several Protestant, Greek Catholic, and Roman Catholic places of worship. The Greek Catholic has the most numerous following of any of the Christian churches in the city. Among the manufactures are tobacco pipes, perfumes, morocco leather, saddlery, fez caps, embroideries, textiles, earthenware, and machinery. Vast forests extend for miles around the city. The suburbs are beautified with numerous cemeteries, many of which have served as burying places for ages.

The city was founded by a colony from Megara about 658 B. C., and was known for years as Byzantium, its ancient name. On account of its commanding position between Europe and Asia Minor, it was the center of Persian, Greek, Roman, and Turkish ambition for centuries. It was occupied by Constantine the Great in 330 A. D., who made it the capital of the Roman Empire, and changed its name to Constantinople, the city of Constantine. The Crusaders occupied it in 1204 and held possession until 1261. The Turks conquered it under Mohammed II. on May 29, 1453, an event marking the extinction of the Byzantine Empire. In 1915 it was the objective point in the eastern campaign of the Triple Entente and their allies, who conducted an unsuccessful offensive to force through the Dardanelles and capture the city. Population, 1914, 1,203,500.

CONSTELLATIONS (kŏn-stĕl-lā'shŭnz), the groups into which astronomers have arranged the fixed stars for convenience in studying magnitude and location. The grouping is not arbitrary, for the reason that the stars may be arranged in as many different groups as inventive imagination may direct. For general convenience the groups are so planned that the several stars occupy points within the limits of an imaginary figure, supposed to be traced on the vault of the heavens. Ancient astronomers agreed upon forty-eight, of which forty-seven are still accepted, the constellation of Antinous being now included in Aquila. At present there are eighty-nine constellations which are generally recognized. Many of the newer groups as classified are located in regions the ancients never beheld. The best known figures include the Great Bear, the Little Bear, the Ram, the Twins, the Great Dog, etc. Eudoxus in 370 B. C. borrowed from Egyptian astronomers the conception of the celestial sphere, brought it to Greece, and first outlined upon it the ecliptic and equator with the more prominent constellations.

The small letters of the Greek alphabet are used to indicate the more prominent stars of the constellations—(α) represents its brightest star,

(β) the next, (γ) the third, etc. The Greek letter is followed by the Latin genitive of the name of the constellation. Thus, (α) Orionis is the most conspicuous star in the constellation of Orion, (γ) Virginis is the third star in the order of brightness in Virgo, etc. Constellations embracing more than twenty-four stars that require especial designation are indicated by the letters of the Latin alphabet and, if these are exhausted, the ordinary Arabic numerals follow. The stars visible to the naked eye are divided into six classes, called *magnitudes,* that of the sixth magnitude being the smallest visible without a telescope on clear, moonless nights. The twenty brightest stars of the firmament are of the first magnitude, and the number increases roughly in geometric proportions.

CONSTITUTION (kŏn-stĭ-tū'shŭn), the organic law of any organized body or association of persons, or the fundamental law of a nation or state. A constitution is the fundamental law of each State of the Union, while the national Constitution is the organic law that binds and holds them all in the national government of the United States. In the states the constitution serves as an engagement between the different portions of society as to the political rights they should enjoy, and the power which they may respectively exercise. Supreme power cannot be wielded successfully by any class of men without abuse. The history of a multitude of emperors, including such as Nero, Caligula, and Tiberius, shows that uncontrolled power may be made a destructive and harmful element. The real power was in the hands of the masses of society during the French Reign of Terror, and gives evidence to what depth unchecked democracy may descend. The tyranny of popedom in the Middle Ages demonstrates that unlimited power cannot be safely intrusted even in sacred hands.

In State organization no class should be allowed full gratification of its desires, its claims should be conceded only with reference to the rights and counterclaims of others. In a government organized on this basis all classes from the lowest to the highest gain real advantage, and liberty is more secure than if the common people, nobility, or crowned sovereigns had full sway. State and national legislation of the United States is vested in the legislative power of the State and national legislatures; the governors and President have executive power, and all these officers are elected for a specified term, and are replaced in office at regular intervals, or may be removed by conviction after impeachment. The judiciary is restrained by prescription and statutes, and interprets and gives meaning to the law. The *habeas corpus* act guards the rights of the people, and they are further protected by the provisions of both the State and national constitutions. The right of trial by jury serves as a bar to malicious prosecution. When necessary, the constitution of the State or nation may be changed by the consent and ratification of the people at regularly appointed elections. The Constitution of the United States at present consists of seven original articles and sixteen articles of amendment, the fifteenth enfranchising the Negro freedmen. It was framed by representatives of the people, who met in convention at Philadelphia, and adopted it on Sept. 17, 1787. It became the fundamental law of the nation on the first Wednesday of March, 1789.

The constitution of the Dominion of Canada went into effect on July 1, 1867, at which time the country consisted of the four provinces of New Brunswick, Nova Scotia, Ontario, and Quebec. However, provisions had been made for the admission at any time as provinces other colonies or territories. Accordingly, Manitoba was admitted in 1870; British Columbia, in 1871; Prince Edward Island, in 1873; and Alberta and Saskatchewan, in 1905. The constitution is similar to that of Great Britain. The executive authority is vested in the British crown and carried on in its name by a governor-general and a privy council. Legislative power is vested in a Parliament of two houses, the Senate and the House of Commons. Each province has a separate legislature and a lieutenant-governor. The right of suffrage varies somewhat in the different provinces and territories.

CONSTITUTION, a celebrated vessel of the United States navy, sometimes called *Old Ironsides* from the hard lumber used in her construction. This vessel was launched Oct. 20, 1797, but was not fully equipped until the following year, when she was put under Capt. Nicholson for service against the French, and in 1799 was the flagship of Commodore Preble in the War with Tripoli. In 1812 she was put under Capt. Hull, who started from Annapolis and ran into a British fleet of five frigates. For three days she avoided an attack by masterly seamanship and escaped after a spirited chase without damage. On Aug. 19, 1812, she encountered the English frigate *Guerriere* under Capt. Dacres off Cape Race, and after a spirited battle of thirty minutes succeeded in wrecking her antagonist. On Dec. 29 of the same year she encountered the *Java,* a British vessel under Capt. Lambert, in the West Indies. Capt. Bainbridge, who had command, fought two hours and forced the *Java* to surrender. In this battle the Americans lost 34 men, while the British lost 100 killed and 200 wounded. On Dec. 30, 1813, the *Constitution,* under Capt. Stewart, sailed toward the West Indies and the following February captured the *Picton* with sixteen guns. In February, 1815, she captured the *Cyane* with thirty-six guns and the *Levant* with sixteen guns, but the latter was afterward retaken by a British squadron and the *Constitution* barely escaped capture. In 1828 the *Constitution* was reported unseaworthy and the navy department concluded to break her up

and sell her old timbers, but the execution of the order was arrested by the opposition of public sentiment created largely by the poem of Oliver Wendell Holmes entitled "Old Ironsides." She was partly rebuilt in 1877 and crossed the Atlantic for the last time the following year, and in 1897 was stored at the navy yard in Boston.

CONSTITUTIONAL UNION PARTY, a political organization of the United States. It was organized by the remnants of the Whig party in the South at a convention held in Baltimore on May 9, 1860, at which delegates from twenty states were in attendance. John Bell of Tennessee was nominated for President and Edward Everett of Massachusetts for Vice President. The platform was of a general character, recognizing "no political principle but the Constitution of the country, the union of the states, and the enforcement of laws." In the election it carried Virginia, Kentucky, and Tennessee, but received no support in the northern states. The popular vote cast for its candidates was about 600,000.

CONSTITUTION OF THE UNITED STATES. See **United States, Constitution of.**

CONSUL (kŏn'sŭl), the name originally given to the two supreme magistrates in the Roman Republic. They were placed at the head of the senate by joint efforts of the patricians and plebeians in 509 B. C., after King Tarquinius Superbus had been expelled. They were vested with equal authority and elected annually. As a condition of eligibility the age of forty-five years was required. It was further necessary that a candidate previously passed through the lower offices of quaestor, aedile, and praetor, and that he be in Rome at the time of the election. At first patricians were alone qualified to hold the dignity, but a plebeian was elected in 366 B. C., and in 172 two plebeians were placed in the office. Their power included declaring war, concluding peace, and making alliances, and extended almost to the limits of power granted to preceding kings.

Consul is a term applied to one of three supreme magistrates in France, designated *First, Second,* and *Third* consuls, who held office between 1799 and 1804. Napoleon Bonaparte was the First Consul and soon assumed absolute power, being proclaimed emperor on April 10, 1804. At present the term is applied to an officer of his own country who resides in a specified foreign country, with a view of promoting the commercial interests of the nation he represents. On arriving at the foreign country he shows his credentials to the government, and obtains an *exequatur* sanctioning his appointment, and conveying to him all the rights and privileges of the office. He reports annually or at specified times to his own government the state of commerce in the foreign country so far as it affects the interest of his own country. The office of consul is now recognized by all leading nations. It was first instituted in Italy in the middle of the 12th century, and was made an official position in all European countries by the 16th century. There are generally three ranks: *consul general, consul,* and *vice consul.*

CONSUMPTION (kŏn-sŭmp'shŭn), a wasting disease which affects the vital organs, but which is most common to the lungs. The greatest number of cases occur between the ages of twenty and fifty, and it is more prevalent in women than in men. The remote origin is often hereditary tendency or constitutional predisposition. The complexion of those inheriting the disease is sallow or white, the veins are conspicuous, the circulation is languid, and the strength is small. Tubercles usually first become seated in the apex of one of the lungs, which cause a dry cough and later a difficulty in breathing. A frothylike saliva and blood are often expectorated. The average duration of the disease is twenty-three months, but death frequently results in nine months, and sometimes in three. There are several types, including the *chronic, latent,* and *acute.* Different climates are marked by a fewer or greater number of cases, though it exists in all countries. Florida, Colorado, Alberta, and the Pacific coast are the most favorable regions for persons afflicted with the disease. Dr. Koch, the great German authority, in 1880 announced the doctrine that tubercles are masses of bacilli which destroy the parts affected. He attained success by inoculating the patients with lymph containing specific morbific matter. Other remedies are the inhalation of dry hot air and balsams, and a change of climate. The best preventive is proper sanitation. In crowded workshops the disease is often spread by expectorations. The sputa on the floor dries and rises in the form of dust. This breathed into the lungs causes the bacilli to settle into the tubes and infect the individual. To prevent this, the spittoons should contain water and be emptied daily into sewers flushed by water.

CONSUMPTION, in economics, the use or expenditure of wealth. In general all commodities are destroyed in entering into new forms of wealth. It is in this way that wealth is increased by means of adding to the value of things existing, and by destroying forms of wealth that they may be reproduced as commodities of greater value. Consumption is characterized as *voluntary* or *involuntary.* The former implies destruction in one form for the purpose of producing another, or for the purpose of immediate gratification; while the latter implies the natural wear and tear, such as rusting of iron or wearing fabrics or metals away by friction. Consumption, from the standpoint of utility, is defined as *productive* and *unproductive.* Productive consumption is the kind that produces commodities of higher value

or commodities of greater utility, while unproductive consumption is the form which is attended by loss and disappointment. The subject of consumption in economics is one of personal and political interest to every citizen. Upon the care exercised in commerce or in managing the products of labor and industry depends largely the fundamental success of the individual and the state.

CONTEMPT (kŭn-tĕmt'), in law, a disregard of the authority of a court or legislative assembly. It may be either *direct,* as by refusal to obey an order of the court, or *constructive,* as when officers of a court are guilty of any corrupt conduct, abuse of process, or culpable neglect of duty. The offending party is liable to punishment for contempt by summary order, without the ordinary form of criminal proceedings, as indictment and trial by jury. The punishment for contempts may be a fine or imprisonment, or both, but, if the contempt consists in the omission to perform an act which is yet in the power of the person to perform, he may be imprisoned until he performs it. All judgments and orders of courts are enforced in this way, except such as are for the payment of money or the delivery of property.

CONTINENTAL SYSTEM (kŏn-tĭ-nĕn'tăl), the blockade of Great Britain ordered by Napoleon on Nov. 21, 1806, by the decree of Berlin. The object was to exclude England from all intercourse with the continent, hence the ports of France and its allied states were ordered closed against all vessels coming from England or her colonies, and it was directed that all commerce and correspondence from English ports wherever found be seized. The English government retaliated by prohibiting trade with France and declaring all harbors of that country and her allies in a state of blockade. Napoleon immediately issued new decrees from Milan, Trianon, and Fontainebleau, in which Denmark, Russia, and Austria were forced to join France against England and all ports of Europe were closed against English vessels, except those of Spain, Sicily, Sardinia, and Sweden. These decrees caused English goods to be smuggled to a vast extent, but British commerce lost heavily until 1812, when Napoleon declared war against Russia chiefly because her ports had been opened to English commerce, and his fall in 1814 was followed by a reopening of all the ports. The Orders in Council issued by England against Napoleon were similar to those enforced against the United States in 1812, and which were largely responsible for the War of 1812.

CONTRABAND (kŏn'trà-bănd), a term applied in commerce to all goods and commodities exported from or imported into any country contrary to law. Commodities imported in opposition or defiance of either of the two nations engaged in war are regarded contrabands of war, and their transportation by neutrals may be prohibited by one of the belligerents. Gen. Butler regarded Negro slaves contrabands of war for the reason that the Negro was an element of strength to the Confederates and aided them in producing munitions of war or rendering assistance in active service.

CONTRACT (kŏn'trăkt), in law, a bargain or agreement between two or more persons, who bind themselves to do or not to do a particular thing. A contract may be *verbal* or *written,* but in some cases, such as the sale of land or the transfer of title in personal property without a change of possession, the agreement must be in writing and acknowledged before a notary public or some similar officer. Usually contracts are made in express terms, but they may be implied from circumstances or the acts of the parties who are mutually interested.

Contracts made in relation to matters forbidden by law, such as gambling and fighting, are illegal. This is true likewise of contracts whose terms are contrary to public policy, such as restrain trade or limit the rights of a citizen. Contracts that imply or relate to bribery, immorality, and the obstruction of justice are illegal because they pervert the acts of government. A *voidable* contract is one made under duress or misrepresentation, and, though not necessarily illegal, may be set aside. An agreement not enforceable by law is said to be *void.* A contract which ceases to be enforceable by law becomes void when it ceases to be enforceable.

The contract is the foundation of all the business transactions. The common law and the constitution of most governments forbid the passage of laws which act to impair the obligation created by a valid contract, and such laws would be universally condemned as a violation of the fundamental principles of civilized society. Almost an indefinite variety of contracts arise in the affairs of business. However, all depend for their validity upon the capacity of the parties to the contract and upon the fact whether or not the agreement is based upon a sufficient consideration. Those who do not possess the capacity to contract include idiots and lunatics, persons of weak mind, intoxicated persons, minors, and habitual drunkards who are under guardianship. Formerly a married woman could not bind herself in a contract, but in most states she is given an equal standing with the husband. Corporations have capacity to contract only in relation to the objects for which they were formed. Whether or not a proper consideration is the basis of a contract is a subject for question by a court. Considerations are of three kinds, that is, good, moral, and valuable. An agreement to give or do something in the future, if no payment is made, may be regarded a good consideration, but it does not bind the party who promises and therefore cannot be enforced. However, a transfer based upon the love and affection of a near

relative is a valid agreement. A valuable consideration implies that money has been paid for a commodity that is a benefit to the payee.

CONTRACTION (kŏn-trăk'shŭn). See **Abbreviation.**

CONVICT LABOR (kŏn'vĭkt), the system of employing prisoners at penal and reformatory institutions. The primary object in giving employment to prisoners is charitable rather than profitable financially, since those confined to prisons usually prefer to work and are personally benefited by the exercise. Many writers regard idleness in prison life a much more severe punishment than the simple fact of being deprived of personal liberty. Three general schemes to employ prisoners are in vogue, those known as the contract, lease, and public account systems. In the *contract system* it is customary for the state to furnish the tools and materials with the prisoners, who are supervised by a contractor. Usually the contractor divides the proceeds from the sale of commodities manufactured with the state, or the contractor furnishes all of the tools and material to be used under the supervision of the state, receiving an equitable share of the product. In the system of *leasing* prisoners the state turns them over to a contractor, who furnishes ample security for their care and employment, and all of the products are the property of the contractor, who is required to pay a reasonable amount for the privilege of the lease. The *account system* implies that all of the work is to be done by the prisoners under the direct supervision of the state.

The employment of convict labor varies greatly in different sections. In many places the convicts are employed on public enterprises, such as road making and the construction of drains and canals. However, it is more common to have them do work within the prison, such as bookkeeping for the institution, laundry work, baking, and other lines necessarily connected with the prison itself. Additional lines of work include the manufacture of buttons, pottery, brooms, clothing, boots and shoes, and garden and field utensils. Some states work their convicts in stone quarries and coal mines. Labor unions have usually declared against the employment of convict labor in lines where it comes in direct competition with free labor, since the tendency is to lower the wage scale. This circumstance and the fact that financial success should not be placed above prison discipline are the most potent arguments against the employment of convicts in lines that compete with free laborers in the market.

CONWAY (kŏn'wā), **Moncure Daniel,** clergyman and author, born in Stafford County, Va., Mar. 17, 1832. He graduated at Dickinson College and Harvard Divinity School, and in 1850 was admitted to the Methodist ministry. Subsequently he became a Unitarian minister in Washington, D. C., and in 1861 had a similar charge in Cincinnati. He lectured in England and was minister at South Place Chapel, London, from 1863 to 1884. Near the close of the last century he returned to America and took up his residence in New York City. His writings include "The Wandering Jew," "The Rejected Stone," "Idols and Ideals," "The Golden Hour," "Pine and Palm," and "Life of Thomas Paine."

CONWELL, Russell Herman, minister and author, born in Worthington, Mass., Feb. 15, 1842. He served as a Union soldier in the Civil War, from 1862 until 1865, was foreign correspondent for the New York *Tribune* and Boston *Traveler* a number of years, and in 1879 was ordained to the ministry of the Baptist Church. He held important charges in Philadelphia, founded Temple College, and established the Samaritan Hospital, Philadelphia. His writings include "Life of President Hayes," "Why the Chinese Emigrate," "Life of Bayard Taylor," "Acres of Diamonds," "Woman and the Law," and "Lives of the Presidents."

COOK, Frederick Albert, physician and explorer, born at Callicoon, N. Y., in 1865. He descended from German parents, graduated at the New York University, and served as surgeon of the Peary Arctic expedition from 1891 to 1892. He was surgeon of the Belgian Antarctic expedition from 1897 to 1899. In 1906 he made the first ascent of Mount McKinley. He sailed in the *J. R. Bradley,* in 1907, on an exploring expedition to the Arctic Ocean and discovered the North Pole, on April 21, 1908. Degrees were conferred upon him by the University of Copenhagen and other institutions. He published exhaustive accounts of his explorations, including "Through the First Antarctic Night." See **Polar Expeditions.**

COOK, James, Captain, noted British sailor, born in Yorkshire, England, Oct. 27, 1728; slain in Hawaii, Feb. 14, 1779. He was the son of a farm laborer and entered the royal navy in 1755, in which he rose to the rank of master. He surveyed the coasts of Newfoundland and Labrador. Later he was placed in command of an expedition to the Pacific Ocean to make an observation of the transit of Venus over the sun, and set sail Aug. 26, 1768, with the *Endeavor.* On returning he sailed around New Zealand, prepared a map of its coasts, and explored the coast of Australia. He made a second voyage in 1772 to explore the Southern Pacific, returning to England in 1774. He made a third voyage in 1776, when he discovered the Sandwich Islands, explored the western coast of North America, and endeavored to ascertain a northwest passage. While on the island of Hawaii he fell into the hands of savages and was killed. His widow was granted a pension of $1,000 and each of his children a pension of $125. The Royal Society honored his name by having a gold medal struck in his commemoration.

COOK, Joseph, lecturer and author, born at Ticonderoga, N. Y., Jan. 26, 1838; died June 25, 1901. He graduated at Harvard University in 1865, studied at Andover Theological Semi-

nary, and began to preach in the Congregational churches. In 1871 he went to Germany and studied two years, and on his return to America lectured and preached with eminent success. He made a lecturing tour of the world in 1880, returned to Boston in 1883, and soon after founded *Our Day*, a religious monthly. He published "Boston Monday Lectures," a work in eleven volumes, containing lectures delivered by him from time to time in Boston. Other works include "New Defenses of the Lord's Day" and "The Higher Levels of Arbitration."

COOKE (kōōk), **Jay,** banker and financier, born in Sandusky, Ohio, Aug. 10, 1821; died Feb. 16, 1905. His father was a lawyer and congressman from Ohio, who gave him a good education by private instruction, and in 1838 he became associated with a banking house in Philadelphia. He joined the firm of E. W. Clark & Co. as a partner in 1842, but retired in 1858 to engage in negotiating bonds and financing railroad companies. In 1861 he established the banking house of Jay Cooke & Co., in Philadelphia, and was the principal financial agent of the Federal government at the time of the war, during which period he negotiated government loans amounting to over $2,000,000,000. The national banking system was advocated and supported by him. In the panic of 1873 his banking house failed, owing to large loans having been made on bonds issued by the Northern Pacific Railroad Company, but the firm eventually paid both principal and interest and successfully resumed business.

COOKE, John Esten, soldier and novelist, born in Winchester, Va., Nov. 3, 1830; died Sept. 7, 1886. He was educated for the bar at Richmond, but soon abandoned it for literature. In the Civil War he served on the staff of Gen. Lee, being in nearly all the battles of Virginia and at Lee's surrender, when he held the office of inspector general of the artillery. After the war he produced a number of interesting historical and other writings. Among his best known are "Leather Stocking and Silk," "The Youth of Jefferson," "Life of Stonewall Jackson," "History of the People of Virginia," "Life of Robert E. Lee," and "My Lady Pocahontas."

COOKERY (kōōk'ĕr-ȳ), the art of preparing food by dressing, compounding, and the application of heat. It originated from the necessities of mankind, since the stomach is too small to contain sufficient vegetable matter to replace the daily waste of the system, hence it is required that foods be prepared and concentrated. Food is rendered more palatable and more easily digestible by cooking, since it loosens the fibers and solidifies the fibrin and connective tissues of meats. It develops the flavor and lessens cohesion, thus improving both the vegetable and animal foods. The art of cooking is as old as the human race, but cooking schools are comparatively of a recent date. Schools of this kind were first established in Europe, where they were introduced as an addition to boarding schools. In America, both in Canada and the United States, many private cooking schools are maintained, and in some of the cities cookery is made a branch of study in the public schools. These institutions study the theory of nutrition and the comparative values of foods, as well as to teach the practical application of methods in cookery. They aid to instill habits of economy in preparing the food for table use, and at the same time promote interest in the scientific preparation of healthful foods.

Foods are usually divided into meats and vegetables, and with the former are included fish and eggs. To prepare meats for table use, they are either baked, boiled, braised, broiled, fried, or roasted. The albumen on the outside of meats coagulates as soon as it comes in contact with heat, hence the best soups are made by placing the meat in slightly warmed water and letting it boil slowly, so the nutritious elements will pass largely into the soup, while meat intended for table use without soup should be placed in very hot water or in an oven highly heated so the nutritious parts will remain largely within it. Vegetables are prepared for the table chiefly by baking, boiling, steaming, or frying, though many varieties are eaten in a raw state. Cookery includes the baking of bread and other foods prepared from ground cereals. All foods should be slightly seasoned at the time of preparation, and additional seasoning may be added at the time of service by each of the guests to suit the taste. When foods are not properly cooked, either too much or too little, they are less pleasurable and possess a smaller degree of nutritive qualities. See **Bread.**

COOK INLET, a bay of Alaska, extending inland about 200 miles from Shelikof Strait. Near its entrance is the northern extremity of the Alaska Peninsula, which is separated by it from the Kenai Peninsula. In the vicinity are lofty mountains and highlands, some of which are characterized by glaciers. Navigation is more or less dangerous on account of severe storms and high tides that sweep up the bay from the Pacific Ocean. Cook Inlet is so named from Capt. Cook, who explored it in 1778, thinking it a passage to the Arctic Ocean. It receives the inflow from the Sushitna and several other rivers.

COOK ISLANDS, an archipelago in the Pacific, located northeast of New Zealand and southwest of the Society Islands. They consist of six larger and a number of smaller islands and reefs, and the total area is 142 square miles. The largest island, Raratonga, has an area of thirty-one square miles. Coffee, copra, and fruits are the chief products. These islands were annexed for administrative purposes to New Zealand in 1900. They were named after

Capt. Cook, who discovered the group in 1773. Population, 1916, 8,450.

COOK STRAIT, a channel of New Zealand, which is separated by it into the two parts known as North Island and South Island. It was discovered by Capt. Cook in 1770 and named in his honor. Wellington, situated on its northern shore, has a fine harbor and is the chief commercial center on its banks.

COOLEY (kōō'lĭ), **Thomas McIntyre,** jurist, born in Attica, N. Y., Jan. 6, 1824; died at Ann Arbor, Mich., Sept. 12, 1898. He was admitted to the bar in 1846, compiled the statutes of Michigan, and became supreme court reporter in 1858, which position he held six years. In 1859 he was chosen professor of law in the University of Michigan and subsequently dean of the faculty. He was elected judge of the State supreme court in 1864, serving continuously until 1885. He lectured on law at Hopkins University for three years, and was appointed on the Interstate Commerce Commission by President Cleveland in 1887, from which he withdrew in 1891 on account of ill health. His lectures and writings on law take high rank. Among the latter are "Constitutional Limitations," "Law of Taxation," "Law of Torts," Principles of Constitutional Law," and "Commentaries on the United States Constitution." He wrote the articles on law in Appleton's "American Cyclopaedia."

COOMBS (kōōmz), **Leslie,** soldier, born near Boonesboro, Ky., Nov. 28, 1793; died Aug. 21, 1881. He entered the army at the age of nineteen, became captain of spies in a regiment of Kentucky volunteers, and subsequently took up the practice of law. In 1836 he organized a regiment of volunteers to aid Texas in the contest with Mexico, and subsequently was a member of the State Legislature. He supported Gen. Harrison for the Presidency, took part in the Mexican War, and favored Henry Clay as the Whig candidate for President in 1844. During the Civil War he gave active support to the Federals.

COOPER (kōō'pĕr), **Sir Astley Paston,** surgeon, born at Norfolk, England, Aug. 23, 1768; died Feb. 12, 1841. He studied surgery at London. Soon after he was appointed surgeon at several hospitals, and in 1793 became professor of anatomy at Surgeon's Hall. He was made head surgeon at Guy's Hospital in 1800. His great work, "Dislocations and Fractures," appeared in 1822, and shortly after he became president of the Royal College of Surgeons. His reputation rests alike on his skill as a surgeon and his efficiency as a teacher and writer.

COOPER, James Fenimore, novelist, born in Burlington, N. J., Sept. 15, 1789; died Sept. 14, 1851. His early education was received from a private tutor and at the age of thirteen he entered Yale college, where he pursued three years of study. Later he entered the navy, rising to the rank of lieutenant. In 1811 he married the daughter of John Peter De Lancey, who was a Tory, and it is thought that this circumstance caused him to resign from the navy on the eve of the War of 1812. For a number of years he lived at Cooperstown, N. Y., where he devoted himself to farming. His first novel, "Precaution," appeared in 1821, but it did not prove a success. The same year he published "The Spy," which secured for him a place in the first rank of novelists. Subsequently he traveled in Europe, and served as consul for the United States at Lyons for three years. He was a restless, busy writer and produced a large number of excellent productions, many of which have been translated into most modern languages. In his writings he created the characters of Harvey Birch, Natty Bumppo, and Long Tom Coffin, which have been widely commented on as features in American literature. He began the writings known as the Leather Stocking Series in 1823, of which "The Pioneers" was the first to be published. Among the best known, besides those named above, are "The Red Rover," "The Pilot," "The Prairie," "The Waterwitch," "The Pathfinder," "The Deerslayer," and "The Last of the Mohicans."



J. FENIMORE COOPER.

COOPER, Peter, philanthropist, born in New York City, Feb. 12, 1791; died April 4, 1883. He was the grandson of John Campbell, a skilled potter of New York, who held the office of deputy quartermaster in the Revolutionary army. His father served in the Revolution and was by trade a hat maker. Later he located at Peekskill, where he worked at hat making and brick making, opened a country store, and brewed ale. Peter assisted his father in these occupations for a time. In 1808 he was apprenticed to a carriage maker, and while with him invented a machine for mortising hubs of carriages that proved of much value. Later he attempted the grocery business, cabinet making, and the manufacture of glue. In addition to these he prepared chalk, isinglass, and other allied products. His business was located at Brooklyn, where he attained considerable success. He bought 3,000 acres of land in Baltimore in 1828, and on it located the Canton Iron Works, the first great enterprise in the iron industry in the United States.

When the Baltimore and Ohio Railroad was constructed in 1830, he produced the first locomotive engine from his own design, called Tom Thumb, the earliest built in the United States. The construction of this engine demonstrated

the possibility of railroad transportation and saved the company from bankruptcy. Subsequently he sold his iron works in Baltimore and became interested in other iron factories, rolling mills, and blast furnaces, and was the first to successfully apply anthracite coal in puddling iron. He became president of the New York, Newfoundland and London Telegraph Company, assisted in laying the Atlantic cable, and served in both branches of the New York common council, where he advocated the construction of the Croton aqueduct. With a view of assisting in the liberal and industrial education of the young, he purchased property in New York and constructed the Cooper Union according to his own plans. Cooper was an active advocate of the greenback movement following the crisis of 1873, and was nominated for President by the National Independent party in 1876, but failed to carry any of the states. See **Cooper Union.**

COOPERAGE (kōōp'ĕr-āj), the ancient art of making vessels of pieces of wood held together by hoops. The products are very numerous, including tubs, pails, casks, barrels, and firkins. The staves are upright pieces forming the sides of a barrel or cask, at each end of which is a head, and the whole is held together by metal or wooden hoops or bands. Barrels whose staves are widest in the middle are said to bulge in the center and taper toward the ends. Those having straight staves form a cylinder, or they are larger at one of the ends than at the other. Cooperage is known as wet or dry, the former producing vessels for holding liquids, while the latter is concerned in the manufacture of an inferior product to hold dry goods, such as crockery and chinaware. The best barrels are made of white oak, which must be thoroughly seasoned before the work is done, and the parts are held together by strong steel bands or hoops, which are put on hot so the contraction on cooling binds the work together more firmly. Formerly much of the work in cooperage was done by hand, but now the sawing and cutting is wholly by machinery.

COÖPERATION (kō-ŏp-ĕr-ā'shŭn), in economics, the association of a number of persons or societies for mutual profit in banking, manufacturing, or any of the industrial arts. It is a form of partnership in which the profits are wholly divided among those interested, in proportion to the contribution of each to the products. The enterprises of this character are usually divided into the three classes of *coöperative distribution, coöperative production,* and *coöperative societies for banking and loaning.* However, in a wider sense all production is coöperative, since it is mutually dependent upon nature, labor, and capital.

Robert Owen, the English social reformer, was one of the early advocates of this system in America, though it had long been in vogue in several European countries. The National Assembly of France voted $600,000 at the time of the Revolution of 1848 to encourage coöperation among the workmen. About 300 coöperative societies were organized under this appropriation as well as others receiving no government aid, with more or less success. A large number sprang into existence about the same time in Germany, Belgium, Italy, and England, most of which were organized for coöperation in distribution, but some with the view of furthering production. Coöperation in distribution is designed chiefly to save the retail profits by dispensing with middlemen. This line is well represented in Canada and the United States by coöperative retail stores and jobbing houses.

Among the difficulties to contend with in coöperative enterprises are the reverses to which all business is liable that requires reserve capital in order to tide it safely over obstacles, a panics or eras of excessive production. If the capital employed is only sufficient to conduct the business when the times are prosperous, a failure may result in panics, or at times when there is a stringency of money in the financial centers. In ordinary business the employer must be a competent man to manage successfully. He should have skill sufficient to put capital and labor together so as to render them profitably productive, and must be an organizer and overseer. It is required that he call into use good financial ability, ready discernment, judgment in buying and selling, and an accurate knowledge of the wants of the public. An employer may be without capital of his own, but he must have the necessary elements to successfully supervise and direct the energy and application of the employees. It is often impossible to secure these essentials in coöperative associations, from which cause many attempts to establish and conduct them on a stable and permanent basis have failed. Where all the members are qualified to do a certain portion of the work and a competent manager and supervisor is available, the system, once permanently established, may prove highly beneficial and render the most wholesome returns to all those interested in the enterprise.

COOPER'S CREEK, a river of Australia, formed in Queensland by the confluence of the Thomson and Victoria rivers. It flows in a general southwesterly direction through an arid region and discharges into Lake Eyre, which has no outlet to the sea. The river is low during the dry season and in places the water sinks out of sight, but in the rainy times it rises fully twenty feet and is about two miles wide.

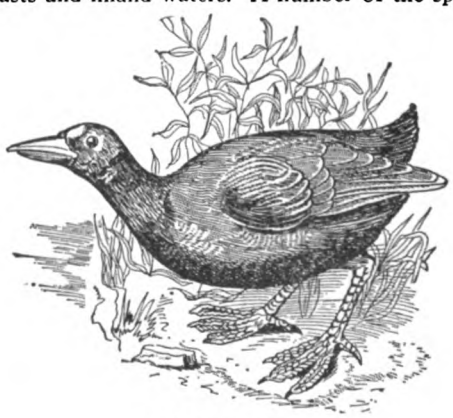
COOPER UNION, an institution of New York City, established in 1859 by Peter Cooper for the advancement of science and art. Instruction is free for the working classes, who have access to courses in art, science, and social and political economy through the medium of individual teaching and lectures. This institution is housed in a large building on the Bowery, at a point where that street divides into Third and

Fourth avenues, and was established at a cost of $630,000. It remained practically without endowment until 1900, when Andrew Carnegie made a gift of $600,000. The annual income at present approximates $100,000, while the endowments are $2,125,000, and the total value of all property is $3,250,000. Instruction is given both to day and evening classes, so as to meet the convenience of working people, and the average enrollment is about 3,000 students. The success of this laudable institution must in a large measure be ascribed to its founder and those who constituted its original board of trustees. These included Peter Cooper, Wilson G. Hunt, Daniel F. Tiemann, Abram S. Hewitt, Edward Cooper, and John E. Parsons.

COOSA RIVER (kōō'sȧ), a river of the United States, formed in northwestern Georgia by the confluence of the Etowah and Oostanaula rivers. It has a general course toward the southwest into Alabama, where it flows through the southern extremity of the Appalachian Range, and near Montgomery is joined by the Tallapoosa River to form the Alabama River. It is about 340 miles long and the lower part of its course is navigable.

COOS BAY (kō-ŏs'), an inlet of the Pacific Ocean, on the western shore of Oregon. It is about 15 miles long and one mile wide, and receives the inflow from the Coos River. Near its entrance is Cape Arago, and on its banks are the cities of Marshfield and Empire City.

COOT (kōōt), a bird of the rail family, native to America and Eurasia, frequenting the coasts and inland waters. A number of the species are widely distributed, migrating to the colder zones in the spring. The common name by which most of the species are known is mud hen. The American coot has a black head and neck and a white bill and frontal plate, and is about fifteen inches long. The general color is brown or dark slate. Its wings measure fully 25 inches from tip to tip, and its weight is from one to two pounds. It is widely distributed in North America from the West Indies to the Saskatchewan. The favorite resorts are the reed-lined borders of ponds, lakes, and rivers. Its skill to run, swim, and fly is well developed. The food consists chiefly of seeds, worms, insects, fish, grasses, and other substances found in shallow water. Its nest is made in the reeds, in which from seven to ten ash-gray eggs, with small black spots, are laid. The young are skilled in swimming shortly after being hatched. While its flesh is eaten, it is not preferred as an article of food.



AMERICAN COOT.

COPAIBA (kŏ-pā'bȧ), or **Copaiva,** a valuable product obtained by making incisions in the stems of certain trees native to the tropical parts of America. It consists of a resin, known as the *resin of copaiba,* and a volatile oil called the *oil of copaiba.* The product has an acrid taste and a peculiar odor, and is valuable in medicine for treating chronic catarrh and other diseases. Castor oil is frequently used to adulterate the balsam of copaiba.

COPE (kōp), **Edward Drinker,** naturalist, born in Philadelphia, Pa., July 28, 1840; died April 12, 1897. His early education was acquired at Westtown Academy, and later he graduated from the University of Pennsylvania. He studied comparative anatomy at the Academy of Sciences in Philadelphia and spent two years in Europe at university work. He returned to America in 1864, was elected to the chair of natural sciences in Haverford College, and in 1867 engaged with the United States government survey, in which service he discovered about a thousand extinct and recent vertebrates. In 1869 he was elected to the chair of geology at the University of Pennsylvania. He was honored by membership in a number of American and European societies, was granted several medals, and lectured extensively. Among his best productions are "Energy of Life and How It Has Acted on Evolution," "On the Origin of Genera," "Snakes and Lizards of North America," "Origin of the Will," Origin of the Fittest," "Primary Factors of Organic Evolution," and "Systematic Arrangement of Extinct Batrachia, Reptilia and Aves of North America." He was senior editor of the *American Naturalist* for a number of years.

COPENHAGEN (kō-pęn-hā'gęn), the capital of Denmark, situated on the islands of Zealand and Amager, which are separated by the Kalvebod Strand, an inlet from the Sound. The portion situated on the island of Amager is called Christianshavn. An excellent harbor is located in the Kalvebod Strand, which is deep and well protected. The principal part of the city is well fortified with old and new fortifications, the strongest portion being the citadel of Frederickshavn.

The principal streets radiate from the Kongens Nystrov, an irregular square, in which is a fine equestrian statue of Christian V. Among the chief buildings are the Church of Our Lady, the Church of Our Redeemer, the Holmen's

Church, the Palace of Charlottenborg, the Royal Academy of Art, and the Exchange Building. Many of the larger structures are decorated with works of art by Thorwaldsen, notably the Church of Our Lady, which contains a kneeling angel holding a shell for a font. The national capital, royal castle, and many other edifices are substantial in construction and beautiful in style. The royal library contains 750,000 volumes, while the National University, founded in 1497, has a library of 350,000 volumes and is attended by 2,000 students. Several botanical gardens, boulevards, and public parks beautify the city.

Copenhagen is the focus of many railroad lines that connect it in all directions. Electric street railways furnish convenient urban and suburban passage. It has gas and electric lights, stone and asphalt pavements, and an elaborate system of sanitary sewerage. In many parts of the city are fine equestrian monuments and fountains. The public schools and educational systems are efficiently organized and ably supervised and rank among the finest in the world. The manufactures include fabrics, machinery, clothing, toys, scientific apparatus, steamboats, musical instruments, leather, and earthenware. It is noted as a publishing center of books and periodicals. The commerce, both by railroad and ocean navigation, is extensive, and has long taken high rank among the most important of Europe.

The history of Copenhagen may be said to begin with the 12th century, when it was a small fishing village. It was fortified in 1167 and soon became of commercial importance, owing to its good harbor. In 1443 it became the capital of Denmark. At present it is the center of Danish art, literature, and education. Population, 1906, 426,540; in 1911, 462,161.

COPERNICUS (kō-pĕr′nĭ-kŭs), **Nicholas,** noted astronomer, born at Thorn, Germany, Feb. 19, 1473; died May 24, 1543. He studied Latin and Greek in his native town, later attended the university at Cracow, and studied law at the Bologna University. His natural bent was toward mathematics, which subject he studied through all its divisions. He became enamored of astronomy and journeyed to Rome, where he lectured on that subject and soon became recognized as a distinguished astronomer. After several years he returned to his native country, and in 1497 became canon at Frauenberg. He divided his day into three portions, one of which was devoted to the duties of his office, one to study, and the other to giving free medical advice to the poor. Beginning with 1507, he devoted his observations and knowledge in propounding newer and more accurate theories of astronomy.



NICHOLAS COPERNICUS.

The system of astronomy promulgated by Copernicus agrees in its essential features with that accepted at the present time. The systems of the Ptolemies and Tycho Brahe place the earth in the center and make the sun and planets revolve around it. However, the system promulgated by Copernicus places the sun in the center, reduces the earth to the humble position of a planet, and assigns the orbits of the planets around the central sun. His assignment of the planets is essentially correct, but he failed to accurately explain the laws by which their movements are governed. This portion of astronomy was left for Kepler and Newton to solve, who gave to the world a correct idea of the great movements of the heavenly mechanism. He wrote a number of books, among them a treatise on trigonometry, several works on astronomy, and a masterful treatise on money. His name is indelibly connected with modern astronomy, of which he is the undoubted founder.

COPIAPÓ (kô-pê-ä-pō′), a city of Chile, capital of the province of Atacama, 50 miles southeast of Caldera, its port on the Pacific Ocean. It is the focus of several railroads and is surrounded by a farming and mining country. Among the public utilities are a library, electric lighting, and a provincial high school. It has large smelting works and machine shops. In one of the public places is a statue of Juan Godoy, who discovered the silver mines in its vicinity. The city was founded in 1707. Population, 1908, 10,510.

COPLEY (kŏp′lĭ), **John Singleton,** painter, born in Boston, Mass., July 3, 1737; died Sept. 9, 1815. After securing an education, he visited Europe in 1774, and later settled permanently in London. Among the most famous of his portraits is one of Washington, who sat for him in 1755. His painting of the King and Queen of England is held in high esteem. Other paintings include "The Death of Major Pierson," "The Assassination of Buckingham," "The Death of Chatham," and "Charles I. Demanding the Surrender of the Five Members." His historical paintings rank with those of West, and his portraits are quite equal to the works of Gainsborough and Reynolds.

COPPER (kŏp′pĕr), a reddish ductile metal. It is the most ductile of the metals next to gold, silver, and platinum; the most elastic, except steel; and the most sonorous, except aluminum. Next to silver it is the most powerful conductor of heat and electricity. Several alloys are formed from copper. Brass is an alloy of one-third zinc and two-thirds copper. Bell-metal, gun-metal, and bronze are alloys of copper and tin. It forms a number of compounds and salts, all of which are poisonous. Copper was known

in prehistoric times, the copper age preceding the bronze age. It was used in ancient Assyria and is mentioned in the Old Testament in Ezra viii., 27. The Greeks and Romans brought it in large quantities from Cyprus, where it was mined near Famagusta.

The United States ranks as the largest copper producing country of the world. The annual output was reported in 1917 at 1,540,685,500 pounds, which is about the average amount produced per year. This is about half of the entire annual output of the world. The three most important copper producing states are Montana, Michigan, and Arizona, in the order named. The principal sources of copper, aside from the United States, are Spain, Germany, Chile, South Africa, Mexico, and British Columbia, but it is found more or less widely distributed in all countries. It occurs native and with the minerals *cuprite, azurite, malachite, bornite, tenorite, chalcocite, chalcopyrite,* etc. In the upper peninsula of Michigan, on Lake Superior, it occurs largely as native copper. In Montana the ores yield about seven per cent. of copper and paying quantities of silver and gold, while the richest in quality found in Arizona yield about ten per cent. of copper. The use of copper is widening continually. Besides its use in electrotyping, engraving, and for household utensils, it is employed largely in shipbuilding, telephones, electrical appliances, cables, trolley wires, and cartridges. The world's supply of copper in recent years greatly exceeds that of former times, but the building of electric railways and electrical apparatus has developed a constantly increasing demand.

COPPERAS (kŏp′pĕr-ạs), the hydrated protosulphate of iron, sometimes called *green vitriol.* It is found in a natural state, resulting from the decomposition of pyritous iron, and is prepared upon a large scale for various uses in art. The manufactured product is generally contaminated with various mixtures, such as the salts of zinc, magnesia, alumina, and copper, and the oxide of iron. Copperas is used in medicine as a tonic, for producing black dyes, for making ink and Prussian blue, and for many purposes in dye works.

COPPERHEAD (kŏp′pĕr-hĕd), a venomous serpent of North America, classed with the rattlesnake family. It is without rattles, but has loral plates on the head. The full-grown copperhead is about three feet long, is a sluggish animal, and has a light copper color with darker transverse bars. It is more abundant in the southern than in the northern states, and locally is known under the names of moccasin, red adder, and cottonmouth. The bite is often fatal.

COPPERHEAD, a nickname given to a political faction during the Civil War, which was generally considered to be in secret sympathy with the South. The name was applied from the copperhead, a poisonous serpent that gives no warning of his intended attack, therefore typical of a concealed foe.

COPPERMINE RIVER, a river of North America, in Canada. Its source is in Point Lake and it has a general course toward the north, discharging into Coronation Gulf, an inlet from the Arctic Ocean. It is about 300 miles long, but is not valuable for navigation, having a large number of falls and torrents in its course.

COPRA, the dried kernal of the cocoanut, from which cocoanut oil is expressed. About 25 pounds of oil are obtained from 500 pounds of copra. See **Cocoanut.**

COPTS (kŏpts), the descendants of the ancient Egyptians. They make up the remnant of the once numerous church of Egypt that maintained the celebrated school of Alexandria. Writers generally agree that they were converted to Christianity by Saint Mark, though they hold that one nature, not two, existed in Christ. The Greeks tyrannized over them, which caused them to submit to the Mohammedans, and to aid them in conquering Alexandria in the year 640 A. D. There are still about 250,000 Copts in Egypt, most of whom reside in its upper provinces. Their dress is similar to the apparel of the Mohammedans, and they are of middle height and dark complexion, and have curly hair. Their language bears the same relation to that of the ancient Egyptians that the Italian does to the Latin. The nucleus of the language came from the ancients, but the spoken tongue is very different from the early spoken tongue on account of the foreign words which were inserted by long contact with the Greeks, Arabs, and Moors. In the 10th century Arabic was used largely instead of the Egyptian, since which time the language has been more or less transitory. The Copts speak a dialect of their own, but learn the Arabic and use it largely. They maintain several convents and a number of secondary monasteries, and support a patriarch, bishops, presbyters, archdeacons, and other minor church dignitaries.

COPYING MACHINE, a device for duplicating letters and manuscripts. Machines of this class may be divided into two kinds, those used in copying writing done by hand or by a typewriter and those in which the copy and the original are made at the same time. In the former it is customary to use a book containing leaves of thin paper, so the letters or manuscripts can be indexed in alphabetical order, and pressure for copying is furnished by a letterpress. The ink used is made specially for the purpose, or common ink may be thickened by adding sugar or some other substance to prevent it from drying rapidly, and when letters written on a machine are to be copied it is necessary to use a copying ribbon. The general method of copying is to place the written manuscript in the copying book, with a piece of oiled paper beneath, then turn a leaf of the book over the writing to be copied, which is covered with a

damp sheet of blotting or unsized paper, and over this is placed another piece of oiled paper to protect the book from absorbing moisture, after which it is placed in the letterpress, and the writing is transferred to the page of the book which lies between the writing and the damp sheet. Pressure is obtained by a screw or lever. Several letters can be copied on the same page or even on a number of pages at the same time. The copying books used most extensively contain 1,000 leaves, and when filled they are marked on the back and placed in the library of records.

More recently it has become customary to write and copy at the same time, which may be done either by hand or with the typewriter when carbon paper is placed between the sheet containing the original and that on which the copy is to be preserved. This method has an advantage where a large amount of business correspondence is necessary with one person or company, especially where it runs through a period of several years. In that case the copies are attached to the letters to which reply is made, hence it is possible to file in a systematic order both the letter received and the reply sent in answer to the same. By using a typewriter it is possible to obtain from one to five carbon copies from one writing.

Thomas A. Edison is the inventor of the *mimeograph*, by which an indefinite number of copies of either hand or machine writing may be obtained. The work is done by placing a sheet of thin paper, coated on one side with a film of paraffin wax, over a plate of steel, known as the *baseboard*, and writing the copy with a fine-pointed steel stylus, using care that the impressions are made entirely over the steel plate, whose surface is corrugated much like a very fine file. When the stencil, or written page, is prepared, it is placed in a frame, which holds it tight and smooth, a sheet of paper is laid on the baseboard, the frame containing the stencil is turned over it, and an ink roller is passed over the surface of the latter, the pressure of which forces the ink through the stencil and produces the writing on the sheet beneath. Stencils prepared by the typewriter are likewise on paraffin paper, the type producing the perforations. A newer form of the mimeograph consists of a device with a revolving cylinder, on which the stencil is attached and the ink on the inner side is forced through and produces the writing on a sheet of paper placed on the baseboard beneath. It is possible to procure several hundred copies from the same stencil by either method.

The *blue print process* is used extensively in copying plans and drawings prepared by architects and engineers. Another device, the *hektograph*, may be used in obtaining from fifty to one hundred copies, but the original writing is done wholly by hand. It consists of a pad or tablet prepared with glycerin and gelatin. The original writing is done with an aniline ink, to which a small per cent. of glycerin is added, and is written on ordinary paper, and this is placed face down upon the hektograph, which receives the copy as soon as the writing comes in close touch with it. To reproduce the writing, a sheet of paper is pressed carefully down upon the hektograph, which transfers a copy to the sheet of paper. The writing is reproduced by slight portions of the ink adhering to the surface, and the number that may be obtained depends upon the care exercised.

COPYRIGHT (kŏp'ŷ-rīt), the exclusive privilege secured by law to authors and their heirs or assigns to publish and sell their productions for a certain time. In the United States the copyright law requires the author, in order to secure a copyright, to file in the office of the librarian of Congress, or deposit in the mail within the United States, addressed to the librarian of Congress at Washington, D. C., a copy of the title of the book, or description of engraving or article, before publication. He is required to send two copies of the production to the same office not later than the day of publication and to pay a fee of fifty cents. A certificate of the copyright is issued on the payment of an additional fee of fifty cents. In Canada the fee is the same, but one copy of the production must be filed in the library of the Parliament of Canada, and one copy in the British Museum, London. The copyright, both in the British possessions and the United States, extends for twenty-eight years, and, if at the end of that time the author is still living, he may obtain its extension for fourteen years longer; or, if dead, his living representatives may obtain its extension, making in all forty-two years. However, in Canada the author or proprietor must publish a notice of the extension in the *Canadian Gazette*. The productions that may be copyrighted include books, engravings, paintings, photographs, maps, blank forms, and many others produced by authors, painters, draughtsmen, etc.

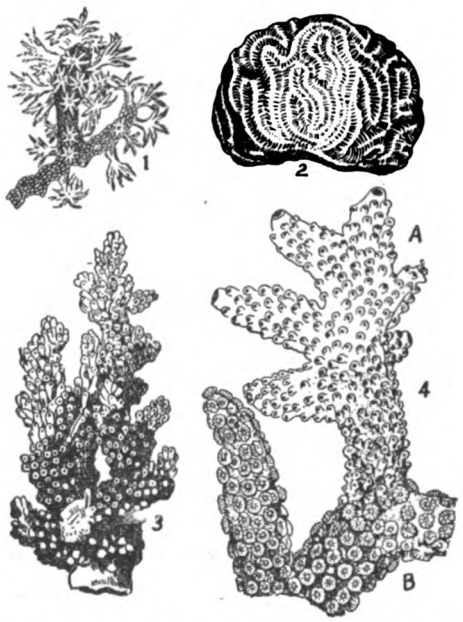
In 1878 a movement began in Paris to promote the *international copyright*, whereby authors and artists hoped to secure protection in various countries. A conference met at Bern, Switzerland, in 1885, at which representatives were present from France, Germany, Spain, Great Britain, Sweden, Norway, Switzerland, Belgium, Italy, Portugal, Denmark, and Mexico to consider the copyright interests of those nations. Great Britain confirmed the Bern convention in 1887 and the United States Congress enacted a law in 1891 by whose terms international copyrights are recognized. The provisions include that the entire manufacture of the foreign copyrighted work must be done within the country where it is to be protected.

COQUELIN (kŏk-lăn'), **Benoît Constant**, actor, born at Boulogne-sur-Mer, France, Jan. 23, 1841. He evinced much aptitude for the

stage at an early age and was admitted to the Conservatoire in Paris on Dec. 29, 1859. His first performance was given at the Théâtre Français in 1860, and, beginning with 1884, he was a regular associate of that institution. His efforts in the dramatic profession of France took high rank, and he played with marked success in Europe and the United States. He is the author of several books which comprise valuable additions to the history of the stage. They include "The Actor and His Art." He died Jan. 27, 1909.

COQUIMBO (kō-kēm'bō), a seaport of Chile, in the province of Coquimbo, 10 miles south of La Serena, with which it is connected by a railway. The surrounding country is agricultural and mining. It has a good harbor and a large export trade, chiefly in copper, gold, silver, and fruits. The principal buildings include a theater, a number of schools, and extensive warehouses. Population, 1916, 8,530.

CORAL (kŏr'ąl), the hard structure or skeleton secreted by the tissues of various marine polyps. These organisms so nearly resemble



1, Red Coral; 2, Brain Coral; 3, Tree Coral; 4, Madrepore Coral. *A*, Skeleton; *B*, Living Corals.

plants that they were long classed with plant life. They propagate themselves by a kind of budding as well as by the production of eggs and young similar to other animals. They are usually compound, many individuals being united into a colony. The coral assumes various forms, being branched fanlike, brainlike, featherlike, or chainlike. The hard coral formations seen on the market are composed of the lime of the ocean, which is incorporated among the tissues of the body, and in this form the remains of these animals make up vast calcareous deposits in the warm seas. The calcareous deposition begins when the polyp is still newly formed, and adheres to a rock or some other object, to which it becomes affixed and on which the coral is built up or grows. In general the deposits of the former generations form the base to which the growing young life is attached. The reforming coral polyps grow only in regions where the winter temperature of the water is never lower than 68° Fahr., but there are several species that grow in colder water. The region where reef-bearing corals live extends 1,800 miles on each side of the Equator, except in the vicinity of Bermuda, which lies in the warm waters of the Gulf Stream. The calcareous remains of polyps form coral reefs. They are classed as fringing, barrier, and encircling reefs, according to the particular manner in which they form coral islands.

Coral islands begin as a *fringing reef* or narrow belt of coral rock, lying near the shore of an ordinary island. *Barrier reefs* are wider than fringing reefs and lie at a greater distance from the shore. An *encircling reef* is similar to a fringing reef and usually encircles the island, forming an *atoll*. A *lagoon* is formed by the island sinking, the coral polyps building upward from the reefs, which eventually leave an open space of water or lagoon in the center. Polyps do not grow at a depth exceeding one hundred feet, nor above the surface of the water. The action of waves breaks the delicate coral structures, and these, together with shells from various shellfish, are ground into fragments and thrown by waves over the general level of the water. In this way reefs and coral islands are formed, but they seldom exceed twelve feet in height.

The islands formed by the coral remains become covered with trees and plants, the seeds being conveyed through the agency of winds and birds from adjacent islands. Reptiles and small quadrupeds are carried to them by trunks of trees floating in the water. Thus, divers forms of life are brought to and extended on the island and reefs. Various products made of different species of polyps are the coral of commerce. Among the valuable classes are the pink, red, and black. The industry of coral fishing is carried on in various regions, particularly in the Mediterranean Sea. Many forms of coral are capable of taking on a polish and are useful in manufacturing ornaments, charms, and divers commodities useful in domestic and social life.

CORAL SEA, the name applied to the portion of the Pacific Ocean lying northeast of Australia. It is bounded on the north by New Guinea and the Solomon Islands, east by the New Hebrides, south by New Caledonia and the Pacific, and west by Australia. The extreme depth, according to soundings made in 1874, is 14,700 feet. It is so named from the large number of coral reefs and islands located within its confines.

CORBIN (kôr'bĭn), **Henry Clark,** soldier, born in Clermont County, Ohio, Sept. 15, 1842. He attended a private academy and studied law, and in 1862 entered the Union army. He was with the Army of the Cumberland until the close of the Civil War. He was mustered out of the volunteer service and entered the regular army in 1866, when he was promoted to the rank of captain and served ten years on the frontier. In 1880 he was made major and assistant adjutant general, was subsequently promoted to the grade of brigadier general, and rendered efficient service in the war with Spain. Congress conferred upon him the rank of major general in 1900. In 1904 he received command of the Atlantic division and served for a time in the Philippine Islands. He died Sept. 8, 1909.

CORCORAN, William Wilson, banker and philanthropist, born in Georgetown, D. C., Dec. 27, 1798; died in Washington, D. C., Feb. 14, 1888. He attended Georgetown College and became clerk in an auction store. In 1828 he was made agent for the real estate owned by the United States and the Bank of Columbia, in the District of Columbia, holding that position till 1836. During the Mexican War he placed many loans for the government. His close attention to business caused him to accumulate a vast fortune, much of which he used in endowing institutions of charity and learning. His principal gifts were made to the Corcoran Art Gallery (*q. v.*).

CORCORAN ART GALLERY, a collection of works of art at Washington, D. C., founded by William Wilson Corcoran and opened to the public in 1869. The Corcoran donations, including the lot and building, amounted to $1,600,000. The building is located on New York avenue, opposite the executive grounds, and has a length of 265 feet. It is constructed of beautiful white marble in the Neo-Greek style, after the plans of Ernest Flagg, of New York. The collections include sculptures, ceramics, paintings, and portraits, and a school of art is maintained to further interest and skill in painting and sculpturing. The famous collections include Hiram Powers's "Greek Slave" and Vincenzo Velas's "Last Days of Napoleon." Visitors are required to pay a small admission toward a charity fund and are admitted only on special days.

CORDAY D'ARMONT (kôr-dā' dę dārmôn'), **Marie Anne Charlotte,** assassin of Marat, born in Saint Saturnin, France, July 28, 1768; guillotined at Paris, July 17, 1793. She descended from a poor Norman nobleman of literary tastes and her mother died while she was an infant. Her younger days were spent in a convent at Caen, where she read the lives of Voltaire, Plutarch, and Rousseau. She sympathized with the Revolutionists, and when her lover, an officer in the garrison of Caen, was assassinated, she determined to cause the death of Marat, whom she thought implicated in the death of her lover. On July 13, 1793, she secured admission to his house under a misrepresentation, and there drove a dagger into his bosom. Marat died immediately.

CORDELE, county seat of Crisp County, Georgia, 65 miles south of Macon, on the Seaboard Air Line, the Georgia Southern and Florida, and other railroads. It has oil mills, machine shops, wholesale houses, and an ice plant. The features include the city hall, court house, federal postoffice, high school, public library, and Y. M. C. A. building. It was incorporated in 1888. Population, 1910, 5,883.

CORDILLERA (kôr-dĭl'lĕr-à), a word of Spanish origin, applied generally to a ridge or chain of mountains. In America it is the name of the vast mountain system which extends along the Pacific coast of North and South America, from the northern part of Alaska to the island of Tierra del Fuego. The Cordilleras of these continents include the Andes of South America and the mountain ranges of North America known as the Rocky Mountains, the Sierra Nevada, the Sierra Madre, and a number of chains in Canada and Alaska.

CORDOVA (kôr'dô-và), or **Córdoba,** a city of Spain, on the Guadalquivir, capital of the province of Cordova. It is situated at the base of the Sierra de Cordova, at an altitude of 325 feet, and has railroad and electric railway facilities. The cathedral, built as a mosque in the 8th century, is in the Moorish style of architecture. In the central plazza is an equestrian statue of Gen. Paz. The Romans founded Cordova in 132 B. C., later it fell into the hands of the Goths, and subsequently became a possession of the Moors. It was the leading city of the Moorish kings from the 9th to the 12th century, and they built many mosques, palaces, and public places. Population, 1910, 65,160.

CORDOVA, or **Córdoba,** an important railroad and commercial city in the interior of Argentina, capital of the province of the same name. It is surrounded by a fertile country, which has productive mineral interests. The city is an important railroad junction between Rosario, on the Paraná, and Tucumán. Its manufactures embrace machinery, cigars, flour, clothing, and furniture. Waterworks, pavements, electric lights, and street railways are among the improvements. It was founded by the Spanish in 1573. The university was built by the Jesuits in 1613 and in 1871 it was the seat of the first national exposition of Argentina. Population, 1906, 56,457; in 1912, 72,830.

CORDUROY (kôr'dŭ-roi), a kind of cotton material in which the pile is cut like that in velvet, but the surface is corded or ribbed. The pile weft is bound to the cloth, causing the ribs which are separated by a but or division. Corduroy is used extensively in making wearing apparel for men.

CORDUROY ROAD, a highway built in marshy places by laying small logs side by side.

It is so named from its rough or ribbed surface. Corduroy roads are constructed only in sparsely settled regions, chiefly in the swamps and marshes found in many of the forests, and are used principally in hauling timbers and lumber.

COREA (kō-rē'ā), or **Korea,** now Chosen, a province of Japan in Asia, located between the parallels of 34° 17′ and 43° north, and between the meridians of 124° 38′ and 130° and 33′ east. It is bounded on the north by Manchuria, east by the Japan Sea, south by Corea Strait, and west by the Yellow Sea. The country occupies mainly a peninsula, separated from Japan by Corea Strait and partly from Manchuria by the Yalu River. The length from north to south is about 600 miles; breadth, 135 miles; and area, 86,100 square miles.

DESCRIPTION. The surface is generally mountainous, with numerous fertile valleys and a productive sea coast. The highest mountains are in the northern part, where the elevations have a height ranging from 3,500 to 8,000 feet, and an elevated ridge extends the entire length of the peninsula, lying chiefly along the eastern seaboard. Most of the northern part and all of the mountains are well wooded, but the hills and fertile plains of the west and south have few trees.

Corea has few large rivers and the drainage is chiefly toward the south and west. The Yalu, on its northern boundary; the Ta-tung, in the central part, and the Keum, in the southern section, are the principal rivers, all of which discharge into the Yellow Sea. The Tuman, in the eastern part, is the only river of note that flows into the Sea of Japan. All sections of the country have an abundant rainfall, which has an annual average of 36 inches, and most of the precipitation is during the rainy season between May and September. The climate, like that of Japan, is equible and healthful. In summer the average temperature is 75°, while the range is from 5° in winter to 90° in summer.

Though Corea does not possess an extensive flora, it is quite rich in valuable forests. Among the chief species are fir, lime, pine, oak, birch, ash, bamboo, mulberry, and hornbeam. Forestry is promoted as an enterprise and the government has a monopoly in ginseng. Many wild animals are abundant, especially the fox, badger, deer, otter, and squirrel. The birds include the crane, ibis, hawk, egret, heron, oriole, cuckoo, kingfisher, duck, and goose. Water fowls are abundant along the coast.

MINING. The mining industry is carried on chiefly under concessions granted to companies organized by capitalists in Great Britain, Germany, Russia, and the United States. Coal deposits are worked in the west central parts, and gold is obtained by placer mining as well as from the ore. The value of the output of gold is about $2,500,000 annually. Copper is found in many sections and most of the output is exported. Other minerals worked more or less extensively are iron, galena, granite, limestone, and sandstone. Most of the coal obtained is bituminous, but profitable veins of lignite and anthracite coal are worked.

AGRICULTURE. Farming is the principal occupation, and rice is the most valuable crop. Most of the land is held in small estates and the soil is tilled with a great deal of care, every available portion being worked to good advantage. Barley, oats, and millet are grown chiefly in the northern part, and tobacco, wheat, maize, hemp and cotton comprise the principal crops in the south. All kinds of vegetables and many varieties of fruit are grown extensively. Cattle raising has had a small share of attention, but this enterprise is being introduced, and milk, butter, and cheese, though largely unknown in Corea, are coming into use as articles of food. Oxen of large size are grown for the market and as animals of burden and draft, and the native horse is a small animal, not much larger than a Shetland pony. Coats, hogs, and poultry receive more or less attention.

MANUFACTURING. The Coreans possess little skill in manufacturing when compared to the Chinese and Japanese. Formerly they possessed considerable ability in this enterprise, and it is largely due to them that the arts and sciences of China were introduced to the people of Japan. Paper is at present one of the chief manufactures. Next in order are products made from hemp and grass, such as mats and cordage. Split bamboo screen, inlaid woodwork, brassware, coarse cotton and silk clothing, hats, and umbrellas are among the general manufactures. The Coreans make a fine grade of thread and a large variety of silk and cotton textiles. Little attention is given to the manufacture of modern machinery, but a large variety of implements and utensils used in gardening and farming are produced. The fisheries yield many articles of food and for export. Among the chief catches are the salmon, halibut, herring, shark, sardine, and whale, all of which enter more or less prominently into manufacturing enterprises, such as curing and canning. The meat of the whale is esteemed as an article of food among the native Coreans.

COMMERCE AND TRANSPORTATION. Corea was long tributary to China, hence its trade with foreign countries remained limited many centuries. Formerly it was almost entirely with China and Japan, but eight of its seaports were opened to the commerce of the world prior to 1900. The imports somewhat exceed the exports. Among the chief imports are kerosene, tobacco, metals, and machinery; while the exports include copper, rice, hides, ginseng, whale flesh, and paper. Few highways have been improved in a first-class condition and travel is still largely in Sedan chairs and on horseback. The rivers are used largely for transportation. Railroads were unknown until 1901, when a line

was constructed between Seoul and Chemulpo, a distance of twenty-five miles. A railway was built soon after from Seoul to Fusan, on the Corea Strait, a distance of 285 miles, and another line extends from Seoul to Wiju, at the mouth of the Yula. The total lines in operation do not exceed 1,000 miles, but there is a large mileage of telephone and telegraph lines, and electric railways penetrate from Seoul into the adjacent country.

GOVERNMENT. Corea paid tribute to China until 1895, when it became an absolute monarchy, but the Portsmouth Treaty, in 1905, made it tributary to Japan. The government is administered by a governor general resident at Seoul, the capital, but all diplomatic business is transacted from Tokio, the seat of the Japanese government. The country is divided for local administration into thirteen provinces and 339 kun or prefectures. In methods of education it remained distinctly Chinese until 1895, when a new public school system was inaugurated, and schools provide work from the primary department to the university at Seoul. A number of the higher institutions maintain departments for languages, including those under the instruction of Japanese, Chinese, German, Russian, English, and French. A number of mission schools are maintained by many of the Christian denominations.

INHABITANTS. Corea is populated largely with a class of people of Mongolian descent, who seem to have sprung from intermarriages of the Ainos, Japanese, and Chinese. Some writers class the Coreans immediately between the Chinese and Japanese, but they are somewhat taller and more robust and have a lighter complexion than either of these races, hence some think that they contain a mixture of Caucasian blood. Polygamy is practised to a limited extent, but is not authorized as an institution, and the women live in seclusion. Colored clothing and hats of horsehair are worn by the nobility, while the common people make use largely of white and uncolored clothing. Buddhism is the chief religion, but in practice it is more or less perverted by Shamanism, and has developed into a form of ancestor and animal worship. The Protestant and Roman Catholic churches find Corea a prolific field for missionary work. Seoul, the capital, is located near the mouth of the Han River. Fusan, on Corea Strait, is important as a port of entry. Other cities include Chemulpo, Pingyang, and Kai-Ku. Population, 1918, 15,560,108.

HISTORY. The early history of Corea is shrouded in doubt and mystery. The nation is thought to have been founded about 1120 B. C., but little is known of it until 108 B. C., when it was made a part of the Chinese Empire. It was divided into principalities about the beginning of the Christian Era, but remained dependent upon China until about 960 A. D., when one of the principalites became independent and soon after annexed the others. It continued to remain an independent kingdom about 300 years, in which Buddhism was introduced and the arts and sciences made strides of advancement. In 1392 the dynasty was overthrown and the priests were banished, and the country was successively invaded by armies of China and Japan, each seeking to secure a preponderance of influence. Japan retained Fusan as a trade center many centuries, but the country was nominally a Chinese dependency until 1895, when it became an independent monarchy.

The first treaty with foreign nations was concluded in 1876, when the ports of Gensan and Fusan were opened to trade, and all the treaties now in force date since that year. The Chino-Japanese War of 1894-95 was caused by a contest of the two nations to control the trade and political tendencies of the country, but the defeat of the Chinese army at Pingyang and the destruction of their fleet in the naval battle off the Yula River decided the fortunes of war in favor of Japan. The treaty that followed made Corea independent, but the Treaty of Portsmouth, concluded after the close of the Russo-Japanese War, in 1905, made Corea tributary to Japan. Japanese occupation is stimulating internal improvement, widening educational influences, and enlarging the commercial and manufacturing enterprises.

CORELLI, Marie, novelist, born in Italy in 1864. She descended from Italian and Scotch parentage, was adopted in infancy by Charles Mackay, and received her training chiefly in England and France. For some time she studied in a French convent, where she received general instruction and a first-class musical training. In 1886 she published her first work under the title "A Romance of Two Worlds." Subsequently she devoted herself chiefly to literature and the collection of rare books. Among her chief works are "Thelma," "The Mighty Atom," "Vendetta," "The Master Christian," "The Murder of Delicia," "Temporal Power," and "God's Good Man."

CORENTYN (kō-rĕn-tĕn′), a river of South America, forming nearly all of the boundary between Dutch and British Guiana. It rises near the boundary of Brazil, in the Tumuc Humac Mountains, has a northerly course, and discharges into the Atlantic Ocean. It is about 400 miles long and is navigable for large steamers only 40 miles, but small vessels navigate it about 150 miles. In its middle course are a number of large rapids and waterfalls.

CORFU (kŏr-fo͞o′), the most northerly of the Ionian Islands, located at the entrance of the Adriatic Sea. The area is 428 square miles. It has a mountainous surface, which is diversified by a number of fertile valleys, and the most elevated point is Pantokrator, 2,995 feet above the sea. Much of the soil possesses fertility and produces a fine quality of cereals, grapes, and fruits. Mineral salt is abundant.

It was settled by a Corinthian colony in the 8th century B. C. and was a loyal supporter of ancient Greece. In 229 B. C. it was made a part of the Roman Empire. Since 1863 it has belonged to Greece. The capital, Corfu, is a fine city. It contains the government buildings, a cathedral, the university, a public library, and free schools. It has a good harbor and a considerable commerce. Population. 1916, of the city, 21,690; of the island, 128,548.

CORIANDER (kō-rĭ-ăn'dĕr), a plant native to many parts of Europe, belonging to the parsley family. When the fresh plant is bruised, it has an unpleasant odor, but when dried the smell and taste are agreeable. It has a branching stem from one to three feet high, and is cultivated for its fruit, which is the coriander of market. It is used in medicine as a carminative, and in cookery and confectionery as an aromatic. The plant has been naturalized in some parts of Canada and the United States.

CORINTH (kŏr'ĭnth), county seat of Alcorn County, Mississippi, ninety miles southeast of Memphis, Tenn., on the Memphis and Charleston and the Baltimore and Ohio railroads. In the Civil War it was regarded an important point and was held successively by both armies. The Confederates evacuated it on May 30, 1862, and it was occupied by Gen. Rosecrans with a force of 20,000 men until Oct. 3 of the same year, when it was attacked by the Confederates under Generals Van Dorn and Price, who were repulsed. The Confederates lost 3,648 men and the Union army, 2,359. At present it has a growing trade in farm produce and merchandise. The chief buildings include a library, several churches and schools, and a number of county buildings. It has manufactures of brooms, woodenware, and machinery. Population, 1900, 3,661; in 1910, 5,020.

CORINTH, a famous city of antiquity, on the Isthmus of Corinth, a neck of land uniting the Peloponnesus with northern Greece. Owing to its beauty and commercial importance, it was called "The Star of Greece." It had three harbors and was important mainly because of its location between the Adriatic and Aegean seas. Among the cities of Greece it was highly renowned, commanded a point of advantage between the trade from Africa and that of Western Europe, and was fortified by walls of stone, on which stood its citadel. Its ancient splendor and magnificence are evidenced only by a few ruins. It was the seat of the Isthmian games, which attracted much attention during Grecian power. Corinth was founded by Sisyphus, an Aeolian, about 1350 B. C. The government was under an oligarchy and a king at different times; Periander was its greatest king and fostered its growth and prosperity. The rise of Athens caused the Peloponnesian War. Later the Corinthian War in conjunction with Thebes, Athens, and Argos was waged against Sparta, and it became the head of the Achaean League. Alexander the Great was elected leader of the Greeks at Corinth against the Persians.

The Romans destroyed Corinth in 146 B. C., but Julius Caesar rebuilt it and made it a prosperous trading center a hundred years later. It was the residence of Saint Paul for a year and a half, who founded here a Christian church, and later wrote his two letters to the Corinthians. After the fall of Rome it was taken by the Slavs, Franks, Turks, and Venetians, and later again by the Turks. It was freed from the Sultan in 1822, but was destroyed by an earthquake in 1858. The city has been rebuilt and is enjoying considerable trade, owing to the canal cut through the isthmus, which is the seat of a large commerce. It has several railroad connections. The new city is more properly called New Corinth. During its greatest prosperity it had 300,000 inhabitants. Population, 1916, 5,265.

CORINTH, Gulf of, an inlet of the Mediterranean Sea, between the Peloponnesus and northern Greece, about eighty miles long. It is beautifully located, has a large number of bays, and the Isthmus of Corinth is toward the east. The gulf has the appearance of an inland lake. It is sometimes called the Gulf of Lepanto.

CORINTH, Isthmus of, an isthmus connecting the Peloponnesus with northern Greece. It is from four to eight miles in width. A ship canal 3.91 miles long, twenty-six feet deep, and sixty-nine feet wide at the bottom has been constructed across it. The canal was opened to commerce in 1893. It saves a long detour in the coasting trade and avoids rounding Cape Matapan. The canal is located along the route on which work was prosecuted in the reign of Emperor Nero in the year 67 A. D. This canal is at sea level and without locks.

CORINTHIANS, Epistles to the, two canonical books of the New Testament, commonly called the First Corinthians and the Second Corinthians, both written by Saint Paul. The *First Corinthians* was written at Ephesus in the year 57 to the Church at Corinth, which Paul had founded in 50, and is a rebuke for vanity, self-seeking, party spirit, impropriety at public meetings, and disrespect to the apostle's authority. It emphasizes the doctrine of the resurrection. In the *Second Corinthians* the apostle makes a summary of his true authority, but it is earnest as well as conciliatory in its statements. Both books have been almost universally received as genuine letters of Paul, and in this respect they rank with the epistles to the Romans and the Galatians.

CORIOLANUS (kō-rĭ-ō-lā'nŭs), **Caius Marcius,** a Roman patrician, so named on account of his bravery in capturing Corioli in 493 B. C., when that town belonged to the Volsci. He was noted as a man of proud and haughty spirit and was strongly opposed to the plebeians, who refused to support him for consul.

To retaliate he made a speech in the senate against a gratuitous contribution of corn which had arrived from Sicily, and insisted that the plebeian tribunes should be discharged from office. These radical speeches caused his impeachment and banishment. For safety he united with the Volscians and aided them in the wars with the Romans. He was so successful that his approach alarmed the Romans. They sent deputations to plead with him for the city, and, only after his relatives implored him in tears, he withdrew to the territory of Volsci, where he lived to enjoy an old age. The "Coriolanus" of Shakespeare is founded on this history, in which he gives the subject a grand and aristocratic character.

CORK, a city of Ireland, on the Lee River, in the County of Cork. A part of the city is on an island, which is joined to the mainland by nine bridges, but the principal site is on the river banks. Though about fifteen miles from the sea, it has a vast commerce and excellent railroad connections with the interior. The exports consist largely of eggs, ham, butter, cereals, bacon, and live stock. Among the manufacturing enterprises are foundries, distilleries, tanneries, breweries, and immense shipyards. The city contains a number of excellent institutions of learning, among them Queen's College, founded in 1849. It has fine Roman Catholic and Protestant cathedrals, a customhouse, and other public buildings. The public park is a finely improved tract of 240 acres and includes a race course. Cork is well fortified and has ample wharfs and facilities for the anchorage of vessels. A part of the trade is carried by way of the fine harbor at Queenstown, about eleven miles below the city. Gas and electric lights, waterworks, pavements, and rapid transit are among the improvements. The Danes built walls around a portion of the city in the 9th century. It was surrendered to Henry II. in 1172. Two members represent Cork in Parliament. Population, 1911, 76,632.

CORK, the light, porous outer layer of bark of the cork oak. It is a very elastic tissue, consisting of thin-walled and nearly cubical cells. The *cork tree* or *cork oak* is abundant in Portugal, Spain, Northern Africa, and most countries bordering on the Mediterranean. It attains a height of from twenty to sixty feet and a diameter of three feet, and has oblong, evergreen leaves. The acorns, which ripen from September to January, depending upon the climate, are edible. Specimens are often seen in which the trunk has a circumference of fifteen feet, owing partly to the thick bark and the great age, which sometimes is from 300 to 400 years. When the tree reaches an age of from fifteen to twenty-five years, the bark is taken off. The first cutting is coarse, but the product improves by successively taking off the bark. A crop is taken off about every eight years, the third being of the finest quality. It is removed with an ax, by which cuts are made both lengthwise and crosswise of the tree, and care is used not to damage the inner bark, else the tree will die. Cork is used extensively for artificial limbs, shoe soles, life belts, net floats, and stopples for bottles and flasks. For the purpose of manufacturing corks, machines are utilized by which many thousands can be cut in a day. The machines and instruments used are of superior material and have a sharp edge so they cut easily. This is necessary, owing to the elasticity of the article.

CORLISS (kôr'lĭs), **George Henry,** inventor of the Corliss engine, born at Easton, N. Y., July, 2, 1817; died Feb. 21, 1888. He invented a device for stitching leather at an early age, and later made a number of useful machines. The most important invention is an improvement for steam engines, by which a uniform motion is secured by means of connecting the governor with the cut-off. By this arrangement the waste of steam is prevented, so the Corliss engines saved the price paid for them in a single year. He founded the Corliss Steam Engine Company in 1844, which grew to be the largest steam engine factory in the world. He was a member of the Rhode Island Legislature for two years, beginning in 1868. In 1872 he was a commissioner for the Centennial Exposition, and served as a Republican presidential elector in 1876. His skill in inventions was recognized by numerous societies, who made him the recipient of high honors.

CORMORANT (kôr'mŏ-rạnt), the name of a large web-footed sea bird of the pelican family. Vast numbers of these birds frequent



CORMORANT.

islands in most parts of the world. They have a long neck, hooked bill, short wings, and stiff and rounded tail. The European species is larger than a goose, occupies cliffs by the sea, and feeds on fish and small quadrupeds. It builds its nests on rocky shores and in trees. The species of America and Australia are very numerous. Some species have been trained to fish, for which purpose they are still domesticated and used in China. The common plan is to fasten a string around the neck to prevent the bird swallowing the fish that it catches. Later it

learns to bring the fish to its master without this precaution being necessary. The cormorants of the Columbia River and the eastern coast of North America are highly prized for their beautiful plumage.

CORN, Indian, or **Maize,** a well-known plant of the grass family, one of the most important cereals grown in the Temperate Zone. It is cultivated extensively as a food and for many purposes in manufacturing. The stem grows from three to twenty feet in height; the average in corn-producing districts is about ten feet. The



CORN OR MAIZE.

stem is filled with a pithy, fibrous structure, is divided by nodes at regular intervals, and its outside covering is of a siliceous formation. It sends out brace roots from the second or third nodes to aid in supporting the stalk when reaching its larger size. The ears are developed within the leaf-sheaf at one or two of the nodes, about four feet from the ground. They consist of a *cob* with from eight to twenty regular rows of grains. The grains of the species which are grown most extensively are yellow or white, but some are red or a mixture of red with white or yellow. Threads of corn-silk are attached to the germs of the grains, which serve to carry pollen from the *tassel* above to the embryo. Corn is considered of greater value as a nutritious food than rye, buckwheat, or barley.

The annual production of corn in the United States exceeds 2,260,000,000 bushels, which is about twice as much as is produced in all the other countries of the world combined. The value of this enormous product is about $780,000,000, nearly twice the value of the gold output of the world, and more than the total value of the product of gold and silver. The states of Iowa, Illinois, Kansas, Nebraska, Texas, Ohio, Oklahoma, and Missouri are the leading corn-producing states of the Union, though a number of others take high rank. The Mississippi valley is the greatest corn-producing region in the world. It is grown profitably in many parts of Canada, but the largest yield is in Ontario, where the annual crop is about 20,000,000 bushels. Corn is planted by machinery in the months of April or May and is cultivated until about the first of July, and the crop is gathered in October and November. It yields from fifteen to ninety bushels per acre.

Many species of corn are grown and all are more or less useful for various purposes. *Pop corn* is a small species which is used for roasting, and is so named because the kernels break open when they are exposed to a brisk heat. This is due to the fact that they are enclosed by a tough covering, which prevents the steam from escaping, causing the kernels to burst open and turn the inner side outward. *Sweet corn* is used largely for eating before maturity and for canning on a very large scale. *Flint corn* is a hardy, yellow species which is grown in the regions where the seasons are short, since it matures early and is quite hardy. The common corn, known as *dent corn,* is the staple species for general use. It is used for meal, corn bread, cakes, and hominy. Alcohol, whisky, starch, and other staple products are manufactured from it. The cob is used for making pipes and as a fuel. However, the most important use of corn is for feed for hogs, horses, cattle, and other domestic animals, for which purpose the stalks as well as the grain are used. Since the adoption of the newer process of grinding grain by roller mills, corn meal has been used as an adulteration in wheat flour. The government of the United States sent commissions to Europe at different times for the purpose of stimulating the consumption of corn as a food among the laboring classes of the densely populated states. Corn is native to America. It was introduced by Columbus into Europe, though it is believed that the maize plant was known in Africa and Asia prior to that time.

CORNCRAKE, a name applied to the land rail of England, chiefly because its cry is *crek-crek.* The color is reddish-brown, or brown-gray, and it haunts the corn and grass land in early summer. The crake is a wader about seven inches long. Several species of American birds, especially the short-billed rails, are frequently called crakes.

CORNEILLE (kôr-nāl'), **Pierre,** tragedian, born at Rouen, France, June 6, 1606; died Oct. 1, 1684. He was educated for the law, but ill



CORN.
(Zea mays).
About ½ Life-size.

(Opp. 678)

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success caused him to go to Paris in 1629, where he engaged as a comedian. He entered the field of tragedy in 1635 and a year later produced his most celebrated work, called "Cid," which gave him recognition among the tragic poets. Among his other celebrated productions are "Cinna," which Voltaire pronounced his masterpiece, "Horace," "Polyeucte," and "Rodogune." He is commonly regarded the father of French tragedy and classic comedy.

CORNEL (kôr'nĕl), the name applied to various plants of the genus Cornus, which include about twenty species of shrubs and small trees. The *Cornus mas,* familiarly known as cornel or cornelian cherry, has oval leaves and yellow flowers, and was formerly cultivated as a fruit tree. The fruit is fleshy, oblong in shape, and is eaten raw or used in making preserves. In some sections it is gathered green and pickled like olives. The *cornelian cherry* is native to Europe. The species common to the United States grow in damp woods and their fruit is not properly edible. About eighteen species are found in North America, some of which thrive as far north as central Canada. These plants are known locally as dogwood.

CORNELIA (kôr-nē'lĭ-ȧ), a celebrated Roman woman of the 2d century B. C., the daughter of Scipio Africanus the Elder and of Aemilia. She was the mother of Tiberius and Gaius Gracchus, two famous tribunes, and of Cornelia, the wife of Scipio Africanus the Younger. Though the mother of twelve children, only three of them lived to adult age. They were carefully trained under her supervision and it is related that she referred to them with the words, "These are my jewels," when asked to show her personal ornaments. The base of her monument, which is now in the Capitoline Museum, Rome, bears the inscription, "Cornelia, Mother of the Gracchi."

CORNELIUS (kôr-nā'lē-ŏŏs), **Peter von,** modern painter, born at Düsseldorf, Germany, Sept. 23, 1783; died March 6, 1867. He began painting at the early age of nine years. In 1811 he went to Rome, where he studied the works of Michael Angelo and Raphael, working in conjunction with Overbeck and Schnorr. His excellent successes were the means of founding a new school of German art and reviving fresco painting. Some of his most famous works were done at Munich, where he painted a series of frescoes based on the legendry of Greek heroes and gods. Among others, he produced a series of New Testament scenes from the incarnation to the judgment, the latter being among the largest and most celebrated frescoes in the world. He painted the "Four Riders of the Apocalypse," in Berlin. Cornelius attained eminence by the spirit of his genius as well as by his excellent painting, largely because many others followed in the same and similar lines. The later years of his life were spent in Berlin, where he was engaged by the King of Prussia. His "Hagen Sinking the Niebelungen Hoard," in Berlin, and his "The Last Judgment," in Munich, are masterpieces of art.

CORNELL, Alonzo B., statesman, born in Ithaca, N. Y., Jan. 22, 1832; died Oct. 15, 1904. He was the son of Ezra Cornell, became telegraph operator, and in 1868 was made director of the Western Union Telegraph Company. President Grant appointed him surveyor of the customhouse at New York in 1873, which position he resigned on being elected to the State Legislature. He was elected Governor of New York in 1879, after which he became connected with large financial interests.

CORNELL, Ezra, philanthropist, born at Westchester Landing, N. Y., Jan. 11, 1807; died Dec. 9, 1874. In 1828 he settled at Ithaca, where he developed the water power tunnel at Fall Creek. The first telegraph line in America, between Baltimore and Washington in 1844, was established and superintended by him, and subsequently he devoted himself to the establishment of lines throughout the United States. Later he established the Western Union Telegraph Company, and in 1865 founded the university at Ithaca, N. Y., which bears his name.

CORNELL COLLEGE, an institution of learning at Mount Vernon, Iowa, organized in 1857. It is under the direction of the Methodist Episcopal Church, and carries classical, scientific, philosophical, and civil engineering courses. The Bowman, Chapel, College, Conservatory, and Science halls are the principal buildings. The library contains 25,500 volumes. It is coeducational. Cornell College is noted for its high moral and intellectual standards. It has a faculty of forty-six instructors and about 850 students.

CORNELL UNIVERSITY, a coeducational institution of higher learning on Lake Cayuga, near Ithaca, N. Y. It is situated on a hill 300 feet high with a view twenty miles down Lake Cayuga and seventeen miles up Enfield valley. This institution was founded in 1865 as a result of the Federal Land Grant Act of 1862, by which large tracts of public lands were assigned to the states for educational purposes, and received a gift of $500,000 and 207 acres of land for use as a site from Ezra Cornell (q. v.), in whose honor it was named. Through the skillful management of western lands by Mr. Cornell and Henry W. Sage and through gifts the property of the university has been increased to about $12,500,000. It has nineteen main buildings, which include the Rockefeller Hall of physics, the Morse Hall of chemistry, the buildings of the New York State College of Agriculture, the Goldwin Smith Hall of Humanities, the University Library with 340,000 volumes, the Law Library with more than 37,000 volumes, and numerous workshops and machine shops. About 150 State scholarships (free tuition) are awarded annually to residents of the State of New York by competitive examination.

Eighteen undergraduate scholarships valued at $400 each and forty graduated scholarships and fellowships of the total value of about $16,000 are distributed annually. The faculty consists of 683 professors and teachers. In the years 1906-07 it had an attendance of 6,225 students for all departments, which is about the average annual enrollment.

CORNET (kôr'nĕt), a metallic wind instrument of the trumpet class, furnished with valves and stoppers. The name formerly applied to it was *cornopean.* Its tone is very agreeable and it is used largely in military bands and orchestras. A number of classes and forms are in general use, of which the cornet-à-piston, a French term signifying a cornet with pistons, is the best known. It is so named from the small pistons which are moved by the fingers in playing.

CORN HARVESTER, a machine for harvesting corn, fitted with a cutting apparatus and a device for binding the stalks into bundles or sheaves. The cutting apparatus differs from that of a reaping machine in that the knives move more slowly, and a balance wheel is utilized to maintain their uniformity in speed. The device used in binding is quite like that of an ordinary harvester, and it is usually fitted to bind the sheaves with sisal or manila twine. The machine ordinarily employed cuts one row of standing corn. The stalks are carried to the binding frame, where the bundles or sheaves are bound and then pushed to the side of the machine and dropped on the ground in such a position that the horses will not step upon them when the next row of corn is cut. Corn cut in this way is bound in small bundles or sheaves, which are afterward set up to form shocks. Other corn harvesters are employed when the grain has matured, and these both husk the corn and gather the leaves and husks for fodder, or they merely strip the ears of their leaves and by an elevator carry them into a wagon, leaving the stalks and husks on the field as waste material.

CORNING (kôr'nĭng), a city of Steuben County, New York, on the Chemung River, about seventeen miles northwest of Elmira. It is on the Erie, the Lackawanna, and the New York Central railroads. The noteworthy buildings include the public library, the city hall, the high school, and the Saint Mary's Orphan Asylum. Among the manufactures are railroad cars, flint glass, cigars, machinery, and clothing. It has electric lights and street railways, waterworks, and other modern municipal facilities. It was incorporated as a village in 1849 and as a city in 1890. Population, 1905, 13,515; in 1910, 13,730.

CORN LAWS, the laws enacted by the British Parliament for the regulation of the trade in grains, both the exports and imports. The exportation of grain was prohibited in many European countries during feudal times with the view of causing a lower price in food products, but this policy worked a hardship upon the agricultural classes of England, and Parliament passed a law in 1436 which permitted exportation when the price of grain fell below a certain limit, though duties were still charged upon the exports. Subsequently the law was amended so as to provide a sliding scale of charges on imports, and these remained in force until the popular agitation of 1846, when Sir Robert Peel declared himself in favor of a repeal of the corn laws. The agitation was very intense under the leadership of Bright and Cobden, who were supported by the Anti-Corn Law League, and in June of that year an act was passed which provided for the gradual abolition of duties. The importation of grain was made entirely free in 1869. It has been a matter of controversy between protectionists and free traders whether the effect of the repeal measure has proved beneficial, and the former point to a decline in agriculture as a consequence of the policy, but the loss is probably more than equaled by the growth in commerce and manufacturing enterprises.

CORNPLANTER, a half-breed Indian of the Seneca tribe, chief of the Six Nations, born in 1732; died Feb. 18, 1836. He was the son of John O'Bail, a white trader and pioneer. In the war between the French and English he sided against the latter, and gave efficient support to the colonies during the Revolution. After the war he was friendly with the United States and displayed much dignity, intelligence, and moral aptitude. His death occurred in Warren County, Pennsylvania. A monument was erected to his memory by the State of Pennsylvania.

CORNWALL (kôrn'wąl), a port of entry and the capital of Stormont County, Ontario, sixty-six miles southwest of Montreal. It is on the Saint Lawrence River, the Cornwall Canal, and the Grand Trunk and the Ottawa and New York railways. Among the features are the courthouse, the public school, and the Lacrosse Club building. The manufactures include cotton and woolen fabrics, flour, paper, and machinery. It has public waterworks and other improvements. Population, 1911, 6,598.

CORNWALLIS (kôrn'wŏl-lĭs), **Charles, Marquis of,** soldier, born in London, England, Dec. 31, 1738; died Oct. 5, 1805. He was the son of the first Earl of Cornwallis, served with distinction in the Seven Years' War, and was made major general at the outbreak of the American Revolution, serving with distinction under Clinton and Howe. In 1780 he was given independent command of a thousand men in South Carolina, and in the same year he defeated Gen. Gates at Camden. The following year he fought against Gen. Greene at Guilford Court House, N. C., and was besieged in Yorktown, where he surrendered on Oct. 17, 1781. He was made Governor General of India in

1786, and probably saved India to the English by his victories over Tippoo Sahib. Returning to England, he was made marquis in 1794 and appointed Lord Lieutenant of Ireland, and was again made Governor General of India in 1805. He ranks as one of the most intelligent and able generals sent to America, being much superior to both Howe and Clinton, and was popular with the colonists on account of his dislike of the British system of taxation.

COROLLA (kŏ-rŏl'lȧ), the inner circle or set of leaves of flowers, usually bright colored. It is composed of leaves called *petals,* which surround the part that bears the fruit. Some flowers have a whorl of leaflike organs intervening between the corolla and the stamens, which are considered an appendage of the former and are prominent in some flowers, as in the daffodil.

CORONA (kŏ-rō'nȧ), in astronomy, a halo surrounding the moon when it is seen projected against the disk of the sun in a total eclipse of the latter luminary. Some scientists suppose it to be the atmosphere of the sun, which at other times is invisible, but this view is not generally accepted, since an atmosphere in the ordinary sense could not exist at so great a distance above the surface of the sun. Astronomers now generally regard it to be the prototype of the terrestrial auroras.

CORONATION (kŏr-ŏ-nā'shŭn), the ceremony or act of crowning a sovereign, as a king or emperor, at which he is invested with royalty. See **Crown.**

CORONATION CHAIR, the throne used at the coronation of kings in England since the time of Edward I. It is kept in Westminster Abbey, where the coronation ceremony takes place. This chair has the famous *Lia Fail,* the Stone of Destiny, beneath the seat, which was used in crowning the kings of Scotland. According to tradition, it is the stone that was used by Jacob as a pillow (Gen. xxviii., 11), and was taken by Tarra to Ireland in the 5th century, whence it was brought to Scotland and afterward to England.

CORONATION GULF, an inlet of the Arctic Ocean, located between Mackenzie and Victoria Land. It receives the inflow of the Coppermine River from the south, and extends as Bathurst Inlet toward the southeast. Dease Strait connects it with Victoria Strait on the northeast, and northwest of it is Dolphin and Union Strait. Within its confines are many islands.

COROT (kŏ-rŏ'), **Jean Baptiste Camille,** landscape painter, born in Paris, France, July 26, 1796; died Feb. 22, 1875. His first work was that of a clerk in a dry goods store and later he began the study of art. At first his progress was slow, but fame and wealth awaited him. His landscapes are true to nature and to produce them he studied the rivers, mountains, lakes, and various sceneries at sunrise and by moonlight. He possessed ability to convey to canvas figures and scenes true to nature in many minute details. Among his most celebrated works are "Macbeth," "The Dance of the Nymphs," "The Baptism of Christ," and "The Flight into Egypt."

CORPORATION (kôr-pŏ-rā'shŭn), a corporate body empowered by law to act as a single individual and having a common seal. There are two classes of corporations—aggregate and sole. An *aggregate corporation* consists of two or more persons incorporated according to law in a society which is kept up by a succession of members, either perpetually or until it is dissolved by mutual consent or limitation. A *sole corporation* consists of a single individual and his successors, organized to perpetuate an office or function which cannot be done in the personal or bodily capacity of any man. For instance, the title to certain church property in Massachusetts is vested in a sole corporation composed of the pastor of the church. In transferring land to a corporation of this class the deed or instrument of conveyance must include the words "and his successors." The office of king or bishop in England is a sole corporation, for the reason that the office is regarded perpetual, and continues to exist though the possessor may die.

Aggregate corporations are under general law of two classes—public and private. *Private corporations* are organized for the purpose of conducting business, societies, coöperative associations, manufacturing, hospitals, colleges, and other enterprises. Organized in this way, the members forming the corporation are individually exempt from liability of the corporation, only the property of the corporation being subject for indebtedness of the organization. However, in some instances the personal liability extends to the amount of the capital stock owned by the individual stockholder. A corporation may sue and be sued as a single individual. The great railroad, telegraph, telephone, banking, insurance, and other companies are organized on a corporate basis. The several states and provinces have laws regulating the formation of corporations. They supervise their organization and fix a minimum to be paid upon the capital stock at the time the organization is formed. Private corporations adopt articles when effecting an organization, in which the capital, indebtedness, privileges, and powers are limited by agreement.

Public corporations are those organized for the government of towns, cities, counties, provinces, and states. Another class of public corporations are those that have for their object the improvement and maintenance of public parks, cemeteries, and similar institutions. It is customary to adopt written by-laws for the government of corporations by the board of directors, who are elected by the members of the corporation. These by-laws may be changed

under certain conditions, but must comply with the provisions and requirements of the articles of incorporation. The business of a corporation is managed primarily by the board of directors, who act principally through the officers, including the president, vice president, secretary, treasurer, etc.

CORPUS CHRISTI (kôr'pŭs krĭs'tī), a festival in the Roman Catholic Church held in honor of the body of Christ. It is observed on the Thursday after Trinity Sunday. It was first celebrated in 1241 at Liège by the canons of Saint Martin and was recommended in a bull issued by Pope Urban IV. in 1263, which was afterward confirmed by the council of Vienna. The name is also applied to a college at Cambridge, England.

CORPUS CHRISTI, a city and the county seat of Nueces County, Texas, on Corpus Christi Bay, about 200 miles southwest of Galveston. It is on the San Antonio and Aransas Pass and the Mexican National railroads, has a good harbor, and is the seat of a large trade in fish, oysters, cotton, and cereals. The noteworthy buildings include the county courthouse, the high school, and the customhouse. It has a canning factory, machine shops, and cigar and tobacco factories. Corpus Christi was settled in 1849 and incorporated in 1876. Population, 1900, 4,703; in 1910, 8,222.

CORREGGIO (kŏr-rĕd'jō), **Antonio Allegri,** painter, born at Correggio, Italy, in 1494; died March 5, 1534. He was the son of a wealthy family, the nephew of an artist, and thus enjoyed many privileges in preparing for his life work. Among the first of his celebrated productions are the paintings of a saloon in the convent of Saint Paolo at Parma, in 1518. He began the decoration of the Parma cathedral in 1522, and here painted "The Assumption of the Virgin," in which the Madonna is borne to heaven by a throng of angels, where she is met by the Saviour. This exquisite production is regarded his masterpiece, but equal grace is shown in his painted figures, nymphs, and goddesses. He was able to put charms and gaiety into his paintings and was a master at blending light and shadow. Among his best productions are the altar pieces in the churches of Saint George, Saint Francis, and Saint Sebastian and the pictures representing the "Marriage of Catharine," "Saint Jerome," "Night," and several Madonnas. His "The Holy Night," in the Royal Museum, Dresden, is greatly admired.

CORRELATION (kŏr-rĕ-lā'shŭn), in pedagogy, the mutual or reciprocal relation of studies, or the act of bringing under relations of union, correspondence, or interaction. Both Froebel and Herbart regarded unity as the important law in education and both wrote much on the subject, making it a fundamental law in their systems. Recent educators have generally supported this principle, and have sought to direct teaching with the view of more fully utilizing the law of association. For instance, the reading lessons are chosen with a view of throwing added light upon contemporaneous lessons in history, botany, and geography. In this way these and similar lessons are made more serviceable in the school course.

CORRIGAN (kŏr'rī-gạn), **Michael Augustine,** Roman Catholic prelate, born in Newark, N. J., Aug. 13, 1839; died May 5, 1902. He was educated at Mount Saint Mary's College, where he graduated in 1859. Later he studied theology at the American College of Rome and was ordained priest in 1863. The following year he was made professor of dogmatic theology and sacred scriptures in the seminary of Seton Hall College, South Orange, N. J., of which he became president in 1868. Five years later he was appointed Bishop of Newark, in his administration of which office the number of churches were increased and several charitable institutions were founded under his direction. In 1885 he became Archbishop of New York. He was not only a devout and earnest Christian worker, but also a scholar of high attainments.

CORROSIVE SUBLIMATE (kŏr-rō'sĭv sŭb'lĭ-māt), the bichloride of mercury, prepared by heating mercuric sulphate with dry sodium chloride. It is a white crystalline solid, very poisonous, and is used to preserve both vegetable and animal substances. Surgeons employ it as an antiseptic spray and to clean and sterilize their operating instruments.

CORRY (kŏr'rī), a city of Erie County, Pennsylvania, ninety miles southwest of Buffalo, N. Y., on the Erie and the Pennsylvania railroads. The noteworthy features include the State fish hatchery, the high school, and a number of mineral springs. It has flouring mills, iron mills, and door, lumber, and sash factories. In the vicinity are valuable deposits of oil, coal, and natural gas. The surrounding country is agricultural. Corry was settled in 1860. Population, 1900, 5,369; in 1910, 5,991.

CORSAIR (kôr'sâr), a pirate or the vessel used by pirates, applied chiefly to the freebooters of the Barbary States. The Corsairs were commissioned by princes to attack the merchant ships of foreign nations and for many years were a scourge on the Mediterranean. In 1800 Capt. Bainbridge sailed to Algiers to pay a tribute to the dey on behalf of the United States, but war was declared against Tripoli the following year and their capital was bombarded in 1804. Algiers declared war against the United States in 1815 on account of a disagreement in regard to the tributes paid, but Commodore Decatur appeared with a large fleet and compelled the dey to sign a treaty. Subsequently the Corsairs were annihilated by the European governments.

CORSICA (kôr'sĭ-kȧ), or **Corse,** an island in the Mediterranean, belonging to France, and forming a department of the same name. It is

110 miles long and 52 miles wide. The area is 3,367 square miles. It is traversed by a number of rugged ranges of hills and mountains, but has tracts of merchantable forests. Monte Rotondo, the culminating peak, has an elevation of 8,620 feet and is crowned with perpetual snow. Many of the rivers have their sources in the mountain ranges, the principal streams being the Golo and the Tavignano; the former is navigable for boats. The soil is fertile in the river valleys and on the coast region, and produces many kinds of cereals, grasses, and fruits. Mineral oil and timber are the chief sources of wealth. The minerals include marble, iron, lead and petroleum. Large interests are vested in rearing sheep, horses, cattle, mules, and goats. The fisheries are a source of considerable profit. Ajaccio, celebrated as the birthplace of Napoleon, is the seat of government. Bastia is an important city.

Corsica was colonized by the Phoenicians and named Cyrnos. It was conquered by the Romans, who gave it the present name. After the decline of Rome it passed to the Goths, was conquered by the Saracens, and taken by the Genoese in the 15th century. France secured dominion over it in 1766. It became independent in 1794 and two years later was again made a part of France, to which country it still belongs. The industries are not in a high state of development, but several railroads have been constructed and other modern improvements are causing a change toward greater production, both in agriculture and manufacture. Population, 1916, 291,160.

CORSICANA (kôr-sĭ-kă'nà), a city in Texas, county seat of Navarro County, fifty-two miles southeast of Dallas, on the Saint Louis Southwestern and the Houston and Texas Central railroads. It is surrounded by a fertile agricultural country, which is rich in petroleum, gas, and coal. Among the chief buildings are the public library, the State orphan asylum, the courthouse, and the Odd Fellows' widows and orphans' home. The manufacturing industries include iron foundries, flouring mills, oil mills, machine shops, and cotton compresses. It has good public schools, pavements, electric lights, street railways, and many fine edifices. Population, 1900, 9,313; in 1910, 9,749.

CORT, Henry, inventor of the process of puddling and rolling iron, born in Lancaster, England, in 1740; died in 1800. He entered business at Gosport, where he built iron works, and was a student of the methods of improving iron manufacture. He was ruined in the business by the unfortunate selection of a partner. The government recognized his service and granted him a pension of $1,000 a year.

CORTELYOU, George Bruce, public man, born in New York City, July 26, 1862. He graduated at Hempstead Institute, Long Island, in 1879, and subsequently at Georgetown University. In 1896 he was given a degree at Columbian University. From 1883 until 1885 he was general law reporter in New York City, was for four years principal of preparatory schools in that city, and in 1889 began public service by engaging as clerk to the New York post office inspector. President McKinley made him his secretary in 1900, in which position he was retained by President Roosevelt until 1903, when he became the first Secretary of Commerce and Labor. He resigned in 1904 to serve as chairman of the Republican national committee in the presidential election, and in 1905 entered the Cabinet as Postmaster-General. Two years later he was made Secretary of the Treasury, serving until 1909.



GEORGE BRUCE CORTELYOU.

CORTES (kôr'tĕs), the national legislature of Spain and Portugal, consisting of an upper house and a chamber of deputies. The upper chamber in both countries is composed partly of hereditary peers and partly of elective members. The deputies of the lower chamber are elected in Portugal for a term of four years and in Spain for five years.

CORTEZ (kôr'tĕz), **Fernando,** conqueror of Mexico, born in Medellin, Spain, in 1485; died Dec. 2, 1547. He was educated for the profession of law, but afterward entered the military service. At the age of nineteen he went on a tour to San Domingo and soon joined Velásquez, with whom he distinguished himself in the expedition against Cuba. Velásquez was governor of Cuba and intrusted the conquest of Mexico to Cortez in 1518, and soon after sought to revoke it, fearing the bravery and ability of this young warrior would deprive him of the credit of the enterprise. However, he maintained his command against the wishes of Velásquez and started with eighteen horses, ten cannon, 700 Spaniards, and eleven vessels upon his important and daring mission.



FERNANDO CORTEZ.

Soon after Cortez landed he fought the Battle of Tabasco and captured Donna Marina, who became his interpreter with the Mexicans.

Those of his army who were friendly with Velásquez wanted to turn back, but he won the leaders by assuring them that success would surely crown his efforts. He burned his ships in order to induce the others to fight with greater bravery, and left no resource for safety except victory by the sword. He founded Vera Cruz, marched to Tlascala, which he conquered, and, taking several thousand Tlascalans as allies, started for the city of Mexico. He reached the capital on Nov. 8, 1519, and was greatly enchanted by the magnificent city of 300,000 people, finding there excellent castles, bridges, aqueducts, and other public improvements.

Montezuma, the Mexican monarch, was friendly to the Spaniards, but after a week he was put in irons and carried to the Spanish quarters. The Mexicans organized to repel the invaders by placing the brother of Montezuma in command. Soon after armed engagements followed, covering a period of nearly a year, in which 100,000 Mexicans were slain, but the country was finally subjugated. Cortez returned to Spain in 1528 and was made captain general, but was not given the position of governor of New Spain, as Mexico was then known. The governorship fell into the hands of a weak ruler greatly to the disappointment of Cortez, who returned to Spain in 1540, reporting the discovery of the peninsula of California. When Charles V. entered upon his famous expedition to Algeria in 1541, he was accompanied by Cortez, and, after being refused the commandership of the army whereby he promised to conquer Algeria, he exclaimed, "I am a man who has given you more provinces than your ancestors have left you cities." On returning to Spain he entered private life and spent the remainder of his time in solitude. He ranked as a passionate but patient man, sometimes cruel, but religious. He was held in high esteem by his soldiers for bravery and ability, though cruelty has been ascribed to him in many of his ventures.

CORTLAND (kōrt'lạnd), county seat of Cortland County, New York, about thirty-six miles south of Syracuse, on the Lehigh Valley and the Lackawanna railroads. The chief buildings include the courthouse, the public library, an academy, and a State normal school. Among the manufactures are stoves, furniture, carriages and wagons, wire, wall paper, and earthenware. The municipal utilities include waterworks, street lighting, pavements, and street railways. It was settled in 1792 and incorporated in 1829. Population, 1910, 11,504.

CORUNDUM (kō-rŭn'dŭm), an alumina mineral found native in a crystalline state. This class of minerals includes a number that are highly prized as gems. Pure corundum ranks next to the diamond in hardness and its value depends upon the color. Sapphire is a blue species; ruby is red, emerald is green, amethyst is purple, and topaz is yellow. The star sapphire, known also as the *asteriated* sapphire, presents a six-rayed opalescent star. Species that have a dark color and possess opaque qualities are known in the market as corundum, while those of a granular formation are designated emery. Deposits of emery occur in Canada, at Chester, Mass., and in Asia Minor. Other species of corundum are widely distributed in all the continents.

CORWIN (kôr'wĭn), **Thomas,** statesman, born in Bourbon County, Kentucky, July 29, 1794; died in Washington, D. C., 1865. He removed at an early age with his parents to Ohio, where he was brought up. His education was that of a lawyer, and, after being admitted to the bar, he soon rose to eminence among his associates. He was elected to the Ohio Legislature in 1822, where he served seven years, and then entered Congress as a Whig, in which position he served ten years. In 1840 he was elected Governor of Ohio and four years later to the United States Senate. He opposed the annexation of Texas and the war with Mexico. President Fillmore appointed him Secretary of the Treasury in 1850, and, after serving in that capacity, he resumed the practice of law in Lebanon, Ohio. The Republicans elected him to Congress in 1858 and reëlected him in 1860. The following year he was appointed minister to Mexico by President Lincoln, but, on the arrival of Maximilian, returned to Washington and practiced law. He ranked as the leading statesman of his time, and was keen in oratory and powerful as an advocate.

COSHOCTON (kŏ-shŏk'tŭn), county seat of Coshocton County, Ohio, on the Muskingum River, twenty-five miles north of Zanesville. It is on the Wheeling and Lake Erie and the Pennsylvania railroads and on the Ohio Canal. The chief buildings include the public library, the courthouse, and several fine churches. It has electric lights, waterworks, and manufactures of ironware, paper, and machinery. The first settlement was made in 1811 and it was incorporated in 1833. Population, 1910, 9,603.

COSMOGONY (kŏz-mŏg'ŏ-nў), from the Greek *kosmos,* world; and *gonē,* generation; an investigation of the origin or creation of the universe. The theories of this science are represented under three general classes: 1. The world as having existed in its present form from eternity. 2. The matter but not the form of the world as having existed from eternity. 3. Both the matter and form of the world having been created by a spiritual cause. The theory that the universe has existed in substantially its present form from eternity has long been accepted by some writers. It was embraced by a number of ancients and was supported by Aristotle. The theory that the matter but not the form of the world existed from eternity prevailed quite generally among various ancient philosophers. They proceeded to reason that no substance or body could have been made out

of nothing, and thought that the elements existed in a state or condition known as *chaos*. Under modifications and changes covering long periods of time, the elements of the chaos were united and began to take on the form and conditions now manifest. After many periods or ages the present form resulted. The advocates of this theory held and still hold that changes go on continually, and that they are as rapid in modern times as they were in any period of the history of the world. This theory in various modified forms was held by the Assyrians, Babylonians, Phoenicians, Egyptians, and other ancient peoples.

The theory that a spiritual cause brought the world into existence is held by the Jews, Christians, and other classes, and is taught in the book of Genesis in these words: "In the beginning God created the heavens and the earth." This theory differs from the second in that it does not hold to the eternity of matter. Having been created in the beginning, it is held that destruction and annihilation will cause it to cease existence in the end. On the contrary, the theory that matter is eternal presumes its continual endurance in the future as well as its existence forever in the past. The elements always existing may change in form by various combinations and movements, but cannot be destroyed or annihilated.

COSSACKS (kŏs'săks), a race of people which became known in Western Europe in the 10th century, when they inhabited the eastern and southeastern parts of Russia. They are thought to be a mixture of Tartar and Caucasian races, though their origin is not clearly established. They bear a close resemblance to the Russians. Their government was originally a kind of democracy with a chief or *hetman* as their ruler. They maintained both civil and military organizations, and were noted for their skill and daring in warfare. In the 15th century they fought against the Turks and Tartars, and were employed by Poland and Muscovy to guard the outposts of Russia. Later their democratic institutions gradually disappeared, when they were absorbed by the Russian dominion, under which government they pay no taxes, but instead render military services. The period in which they are subject to military duty extends from the age of eighteen to fifty, and each man is obliged to furnish his own horse.

Cossack cavalry has rendered the Russian Empire valuable services in many emergencies. The Cossacks were effective during the retreat of Napoleon after the burning of Moscow, when they inflicted serious damage to his army, as well as in the wars against Turkey and on numerous other occasions. They have rendered excellent services as scouts and skirmishers. In military service they wear a distinct uniform of dark green. Their principal rendezvous, called Tcherkask, was located on the Don in 1570, but, owing to overflows, New Tcherkask was founded in 1805, which is now the capital of the province of the Don Cossacks and constitutes a government of Russia. It has an area of 63,532 square miles and a population of 3,125,718. In industry and intelligence the Cossacks are superior to the average Russian. Having supported the Czar in the war, they reluctantly joined the revolution in 1917.

COSTA (kŏs'tà), **Sir Michael,** composer and conductor, born in Naples, Italy, Feb. 4, 1810; died April 29, 1884. He studied music under Zingarelli at the Conservatoire of Naples and in 1828 began to sing and conduct in public festivals. In 1830 he was appointed conductor of music in the Italian opera, London, where he had a successful career until 1847, when he resigned to become conductor of the Royal Italian Opera at Covent Garden. Queen Victoria knighted him in 1869 and the King of Württemburg bestowed upon him the Royal Order of Frederick. His oratorios include "Eli" and "Naaman."

COSTA RICA (kŏs'tà rē'kà), a republic of Central America, located between Nicaragua and Panama. It is bounded on the north chiefly by Nicaragua, east by the Caribbean Sea, southeast by Panama, and west by the Pacific. The area is 21,500 square miles. Much of the surface is elevated and mountainous. The Talamanca Range of the cordillera of the Isthmus of Panama traverses the interior and includes a number of lofty volcanic peaks, reaching an elevation of 12,700 feet. Irazú and Turrialba, the former 11,500 and the latter 11,350 feet high, are active volcanoes. The western coast is indented by several extensive inlets, of which the gulfs of Dulce and Nicoya are the most important. Columbus discovered the region on his fourth voyage. It became free from Spain in 1821, and has since been a republic. A number of rivers drain the interior, among them the Trinidad, San Juan, Macho, and Dulce. A large portion of the surface along the coasts and in the valleys is exceedingly fertile. Owing to various altitudes, the climate is divided into three zones. The torrid zone lies below 3,000 feet; the temperate, between 3,000 and 7,500 feet; and the colder zone, above 7,500 feet, where frosts are frequent.

The principal industry is agriculture, the two most important products being coffee and bananas, but all cereals and fruits are successfully cultivated. There are productions of gold, silver, iron, copper, coal, and mineral oil. The foreign trade is largely with the United States, Germany, and Great Britain. The exports exceed the imports, the former having a value of $9,550,500 and the latter, $7,850,500. Railroads have been constructed by the government and under grants to European capitalists. Tramways and street railways are maintained in the larger cities, while the telegraph and telephone lines have a large mileage. San José is the capital. Other commercial cities are Cartago,

Alajuela, Puntarenas, and Heredia. Limón and Puntarenas are the most important seaports.

The government of Costa Rica is vested in a president, whose term is four years, a legislature of one department, and a national judiciary. Education is compulsory. The common schools are supplemented by several institutions of higher learning. Roman Catholic is the state religion, but all denominations are granted liberty of conscience. About 3,200 Protestants and 350 Buddhists are in the country. Immigration, manufacturing, and agriculture are encouraged by a public policy under governmental supervision. In general the social and economic conditions are decidedly the best found in the Central American republics. Spanish is the official language, but only a portion of the people are of purely European descent.

Columbus visited the region included in Costa Rica in 1502. The first permanent settlement was made in 1530. It became free from Spain in 1821 and was a part of the Republic of Mexico until 1823, when it became a part of the United States of Central America. Since 1848 it has been an independent republic, with the exception of a brief time in 1897, when it was a constituent member of the Greater Republic of Central America. The foreigners number 6,295 and are chiefly from Spain and Germany. Population, 1906, 344,995.

COSTER (kŏs'tĕr), **Lourens,** inventor and printer, born in Haarlem, Holland, about the year 1370, died in 1440. It is claimed that he was the first inventor of movable type. At first he constructed letters cut out of the bark of the beech tree and employed them for his own amusement and for writing short sentences. Later he discovered a glutinous ink which did not spread readily in using, and with it succeeded in printing entire pages with characters and cuts. After printing several matters in this way, he replaced the wooden forms by types cast of pewter, which he found more durable and better suited to the purpose. It is claimed he kept his invention a secret, owing to the danger of being punished by the clergy, to whom manuscript writing was exclusively intrusted. After his death a German named Johann Gensfleisch secured most of the types and matrixes and took them to Mentz, where they were made public. Some writers credit the Gutenberg family, of which Johann Gensfleisch was probably a member, with the invention of printing. However, the honor of Coster is still held in remembrance by his native town, where a monument has been erected to perpetuate his memory. A number of specimens of early printing alleged to have been done by him are preserved in various places, notably in his native town.

COTES (kōts), **Sara Jeanette Duncan,** writer of novels and travels, born at Brantford, Canada, in 1863. She was educated at the Collegiate Institute and began writing for the *Canadian Monthly* of Toronto. She wrote largely for Canadian newspapers and periodicals from 1883 to 1888, including the Toronto *Globe* and the Montreal *Star.* In 1888 she made a tour of the world in the interest of the Canadian Syndicate. In 1890 she married Edward Everard Cotes and resided for some time at Calcutta, India, where her husband was engaged as scientist for the East India Company. Among her productions are "A Social Departure," "An American Girl in London," "The Story of Sunny Sahib," "Daughter of To-day," and "Vernon's Aunt."

COTOPAXI (kō-tō-păks'ē), the most celebrated volcano in the world. It is located in the Andes of Ecuador, about thirty-two miles from Quito. The earliest eruptions on record occurred in 1532 and many have since been noted. Among the most remarkable are those of 1744, 1768, and 1864. During several of the eruptions the sounds were heard at a distance of 500 miles and ashes were carried 125 miles. Outbursts are attended by smoke and flames and large quantities of ashes are expelled. The volcano is crowned with perpetual snow. It was first ascended by Wilhelm Reiss in 1872, who estimated the height of the northwest peak at 19,500 feet and the peak toward the southwest at 19,430 feet.

COTTON (kŏt't'n), the name applied to the fibers that surround the seeds of the plants be-



Cotton, showing flowers and bolls.

longing to the genus *Gossypium,* commonly called cotton plants. These plants are native to tropical regions, but they are cultivated extensively within the belt lying between latitudes 35° north and 35° south of the Equator. They



(Opp. 686)
PICKING COTTON ON A PLANTATION IN THE SOUTHERN STATES.

are shrublike, have lobed leaves, mostly yellowish flowers, and a celled capsule which bursts open when ripe and liberates a quantity of black seeds covered with the cellular fibers. Several species are grown in the United States. The short fiber cotton has fibers about an inch long and the long fiber, about two inches. The former is known as *upland* and the latter as *Sea Island* cotton. In quality the Sea Island cotton is the best. It is cultivated upon the lowlands in a number of the Southern States and on the islands adjacent to the coast.

Cotton has been grown since immemorable times in history. It is spoken of in the writings of Herodotus as growing in India and its fibers being used in the manufacture of cloth. It is mentioned by Aristobulus, one of Alexander's generals, and is referred to a number of times by Pliny. The Arabians made cotton goods in the time of Mohammed, about 627 A. D., and his followers introduced them into Africa and Spain. By the 14th century they had spread to Italy, and afterward came into use in the whole of Europe. Cotton fiber is mentioned in English history as early as 1436, when it was used on a small scale, but in 1736 it began to be made into cloth by machinery invented by Louis Paul. Cotton goods are among the leading staples of the world, and are manufactured extensively in most of the large industrial centers. In the United States the leading manufacturing centers are at Manchester and other cities of New England.

The cotton plant was found native by Columbus in the West Indies and in South America. The early Mexicans used cotton cloth extensively. Cotton seed was brought to Georgia in 1786 and the first cotton mill in America was erected two years later at Beverly, Mass. The United States produces about 13,500,000 bales of cotton annually, which is about two-thirds of the world's product. In 1916 the world's crop was reputed at 19,942,500 bales. The bales are made by machinery and are held in position by hoops. They weigh about 515 pounds. Texas is the leading cotton State. Others taking high rank are Mississippi, Georgia, Alabama, North Carolina, South Carolina, Louisiana, and Arkansas, though it is produced in large quantities in a number of other states. The principal supply of cotton, outside of the United States, is secured in India, Egypt, Russia, China, Brazil, Mexico, the West Indies, and the Asiatic islands of the Pacific Ocean.

Cotton is cultivated in fields like corn, the method differing somewhat. The ground is plowed in the spring and the seeds are drilled or planted about three feet apart, the plants appearing above the ground in about eight days. The young plants are cultivated and weeded, this being required two or three different times. After the plants flower no further cultivation is needed, and the seeds ripen after a period of about seventy days. Cotton is gathered within eight days after coming to maturity in order to prevent tarnishing. The gathering is done by picking the cotton fibers from the pods or bolls by hand into baskets or bags hung from the shoulders of the pickers, which is done several times during the picking season, as the bolls do not all ripen at the same time. The crop is spread out to dry as soon as it is secured. When sufficiently dried, the cotton is passed through machinery by which it is separated from the seeds. It was formerly separated from the seeds by hand. The invention of the cotton gin in 1793 by Eli Whitney greatly revolutionized, cheapened, and lessened the labor. By this machine it is separated rapidly from the seeds by means of teeth projecting through slits in the side of the chamber in which the seed cotton is placed. It is then baled and made ready for shipment to the manufacturer.

At the factory it is spun into cotton cloth, or it is mixed more or less with silk, wool, linen, and alpaca to form various fabrics. The early cotton-spinning machines were of rude construction. Among the earliest are Hargreaves' spinning jenny and a water frame made by Arkwright. In 1779 Crompton invented a machine propelled by a mule, while in 1785 the Cartwright power loom and Watt's steam engine were applied to cotton spinning and weaving. The machinery employed at the present time for cleaning, pressing, spinning, and weaving cotton has reached a high state of perfection. It is propelled largely by water, steam, or electric power. The consumption of cotton in manufacture in the United States is very extensive, and large exportations of the raw material as well as manufactured products are made to all portions of the world. Raw cotton is exported chiefly to Great Britain, Germany, France, Italy, and Canada. The exports of manufactured goods aggregate about $27,500,000 per annum, while the domestic consumption is much larger.

The cotton stalks are used in the manufacture of pulp, from which a good grade of writing paper is made. A fine class of oil is manufactured from cotton seed. It is useful for food and enters largely into the production of lard and fine grades of manufactured butter. Cotton-seed cake is a valuable food for domestic animals. The cotton acreage of the United States is about 28,000,000. In 1914 the total number of active spindles in the world was reputed at 123,332,971, of which 26,395,191 were in the United States. The chief uses of cotton goods are for wearing apparel, bedding, and carpets. Among the principal pests to the cotton plant are the boll moth and the boll weevil. The *boll moth* deposits its eggs on the under side of the leaves, where they hatch in about three days, and the larva, known as the *boll worm*, is very destructive to the plant. The cotton boll weevil is a beetle with an elongated head. It punctures the bolls of the cotton plant to lay

its eggs within, where they produce white maggots, which do much damage. Another pest, the *redbug,* or *cottonstainer,* is suctorial and drains the sap from the bolls.

COTTON, John, clergyman, born in Derby, England, Dec. 4, 1585; died Dec. 23, 1652. He studied at Trinity College, Cambridge, and gained a high reputation for learning. While at Cambridge he became inclined toward the Puritan faith and in 1633 was summoned to appear before Archbishop Laud, but escaped and came to Boston, where he was chosen pastor of the first church organized in that city. He continued as pastor until his death, wielding a powerful influence over affairs both secular and ecclesiastical. His writings are very numerous, including about fifty volumes, all of which were printed in England. He conducted an extended controversy with Roger Williams, who was expelled from Massachusetts with his approval, and he was an opponent to the views of Anne Hutchinson. Among his books are "The Keys to the Kingdom of Heaven," "A Treatise Concerning Predestination," "A Brief Exposition Upon Canticles," "Set Forms of Prayer," and "A Treatise of the Covenant of Grace."

COTTON, Sir Robert Bruce, antiquarian, born in Benton, England, Jan. 22, 1571; died May 6, 1631. He was educated at Cambridge University and became interested in the collection of rare books and manuscripts. His collection of ancient manuscripts was very valuable, since it included a large number that had been widely scattered at the time Henry VIII. dissolved the monasteries. He was knighted in 1603 and was made a baronet in 1611. Sir John Cotton, his great-grandson, bestowed the library on the nation, and in 1753 it was removed to the British Museum.

COTTON FAMINE, the name applied to the failure of the cotton industry in England, which occurred in 1861-65, when the Civil War was raging in the United States. The war caused the supply of raw cotton to be shut off and thus compelled the closing of the manufactories. About 300,000 English laborers were thrown out of employment and 2,000,000 people reduced to the verge of starvation. The government relieved the distress somewhat by granting charitable aid.

COTTON GIN, a machine for separating the seeds from cotton fibers. It was invented by Eli Whitney in 1793. See **Cotton; Whitney, Eli.**

COTTON SEED, the seed product of the cotton plant. From it the cotton batting, cotton-seed oil, and cotton-seed meal are manufactured. The cotton batting is made from the lint that clings to the seed after passing through the cotton gin, while the other two products are made from the seeds proper. Cotton-seed meal is a valuable food product for horses and cattle, while the cotton-seed oil, known in the market as cottolene, is wholesome as food for table use. Cotton-seed oil is employed extensively as a substitute for lard, linseed oil, and sperm oil. It is used for lubricating, soap making, treating leather, and divers other purposes. The annual value of cotton-seed oil exported from the United States aggregates $15,000,000, while the value of lint and oil cake is almost as large.

COTYLEDON (kŏt-ĭ-lē'dŭn), the first leaf, or one of the first two leaves, developed in a plant. In exogens two such leaves are present in the embryo in every plant, while in endogens there is but one. The two cotyledons on exogens are always opposite, while in endogens the second leaf developed is alternate with the first. From these well-known characteristics have been developed the three primary divisions of the vegetable kingdom—the dicotyledons, monocotyledons, and acotyledons.

COUCH, Darius Nash, soldier, born at South East, N. Y., July 23, 1822; died in 1897. He graduated at the West Point Military Academy, served with distinction in the Mexican War, and in 1847 was brevetted first lieutenant for gallant service at Buena Vista. Subsequently he served against the Indians and resigned in 1855 to become a merchant in New York, but at the beginning of the Civil War entered the Union service as a colonel of volunteers. He was with the Army of the Potomac, taking part in the battles of Fair Oaks, Williamsburg, and Malvern Hill, and in 1862 was promoted to be major general and as such commanded at Fredericksburg and Chancellorsville. In 1863 and 1864 he had command of the department of Susquehanna, took part in the Battle of Nashville, and resigned from the service at the close of the war. He was an unsuccessful candidate on the Democratic ticket for Governor in Massachusetts in 1869, and subsequently held a number of military offices in Massachusetts and Connecticut.

COUES (kouz), **Elliott,** naturalist, born in Portsmouth, N. H., Sept. 2, 1842; died Dec. 25, 1899. He graduated from Columbian University, Washington, D. C., in 1861, entered the United States army as medical cadet in 1862, and served as assistant surgeon from 1864 to 1881. He became professor of comparative anatomy at Norwich University, Virginia, in 1869, and surgeon and naturalist of the United States boundary commission in 1873. Later he held several other important positions and wrote a number of works on natural sciences. Among the most celebrated of his works are "Key to North American Birds," "New England Bird Life," "Birds of the Colorado Valley," "Field Ornithology," and "Doemon of Darwin."

COUGAR (kōō'gär), the name given to the puma in Brazil, formerly called the American lion, and now often mentioned as the American panther. Formerly it was found throughout a vast region of both North and South America, but it has been destroyed in all of the former, except in its most southerly portions.

COUGH (kąf), a sudden and violent expul-



SEA ISLAND COTTON

(Gossypium barbadense).

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1. Flower.
2. Anther.
3. Pollen grain (enlarged).
4. Longitudinal section of ovary
5. Cross section of ovary.
6. Seed pod opening at the top.
7. Seed and fibers.
8. Seed without fibers.
9. Cross section of seed.
10. Seed (enlarged).
11. Embryo.

(Opp. 688)

sion of air from the chest, caused by the relapse action of nervous or gastric disorder, or by irritation in the air passage. Coughing occurs when the source of irritation is in or below the posterior fauces, and sneezing when the irritating cause acts on the nasal mucous membrane. It may be dry, as in the first stage of pleurisy; or humid, as in certain stages of pneumonia and in advanced consumption. The act of coughing may be single and with distant intervals, or long continued, as in whooping cough and bronchial catarrh. In croup and whooping cough it has a metallic ring. As a general rule coughing may be taken as a symptom of disease.

COULTER (kōl'tĕr), **John Merle,** botanist, born in Ningpo, China, Nov. 20, 1851. His parents were American and provided for his education at Hanover College, Indiana, and subsequently he studied at Harvard University. In 1891 he became president of Indiana College, served as president of Lake Forest University in 1893-96, and in the latter year accepted the head professorship of botany in the University of Chicago. He is the author of several standard works on botany and contributed to a number of periodicals and works of reference. Among his books are "Handbook of Plant Dissection," "Manual of Rocky Mountain Botany," "Manual of the Botany of Western Texas," and "Synopsis of the Flora of Colorado."

COUNCIL BLUFFS, a city in Iowa, county seat of Pottawattamie County, on the Missouri River, opposite Omaha, Neb. It is on the Chicago and Northwestern, the Illinois Central, the Chicago Great Western, the Union Pacific, the Chicago, Milwaukee and Saint Paul, the Chicago, Burlington and Quincy, and other railroads. Next to Sioux City, it is the most important city of western Iowa, and is connected by several bridges and electric street railways with Omaha, Neb., across the Missouri River. The chief buildings include the county courthouse, the Carnegie Library, the Grand Hotel, the Federal building, the high school, and the Iowa School for the Deaf. Bayliss and Fairmont parks are popular public grounds. The manufactures include agricultural implements, machinery, carriages, engines, ironware, clothing, and earthenware. Its location at the western termini of a large number of railroads and connection with principal Pacific coast lines makes it an important jobbing and commercial city. It has good municipal facilities, such as street railways, electric lights, pavements, waterworks, and sewerage. The city was named from a council held on its site by Lewis and Clark with the Indians in 1804. It was settled in 1846, when it was known as Kanesville, but it was incorporated as Council Bluffs in 1850. Population, 1905, 25,231; in 1910, 29,292.

COUNTERFEITING (koun'tĕr-fĭt-ĭng), to make something in imitation of an article of value without legal authority and with a fraudulent intent. The act of uttering counterfeit coin, bank notes, or other currency is a felony punishable by fine or imprisonment. The government, as a safeguard against counterfeiting, has its paper currency engraved with designs that can be reproduced only at great expense. In addition, several secret marks and combinations of letters and figures are employed and paper and ink of a peculiar kind are used. The counterfeiting of coins consists of imitating the genuine by using a cheaper or comparatively worthless metal.

COUNTERSIGN (koun'tĕr-sīn), the signature of a secretary or other public officer to attest that a writing has been signed by a superior. In military affairs the countersign is a watchword given daily by the commander of an army, in order that the soldiers on guard may distinguish whether those wishing to pass are friends or enemies. Those who are unable to give the countersign are not permitted to pass.

COUNTY (koun'tȳ), a name derived from a tract of land subject to a count or earl, and now applied to a division next smaller than a state or province. The name *parish* is applied to these divisions in some states and *shire* is the term used in England. A county has such officers as sheriff, attorney, auditor, treasurer, coroner, clerk, and commissioners, and in some cases a judge. In most states or provinces the roads, poor, local elections, and other interests are under supervision of the county. The county is divided into townships or parishes.

COUPÉ (kōō-pā'), a four-wheeled vehicle with a low body, drawn by one horse and provided with a seat for two passengers within and a separate outer seat for the driver. Coupés are closed carriages and are sometimes called cabs and broughams. In continental Europe the name is applied to a compartment in a railway carriage.

COURT (kōōr), **Antoine,** clergyman, born at Villeneuve de Berg, France, Mar. 27, 1696; died June 15, 1860. He descended from a family of peasants who adhered to the Protestant church, and at the early age of seventeen began to speak at the meetings held secretly. It was his ambition to build up the Protestant faith, which was strenuously persecuted in France at that time. In 1714 he formed a congregation in Provence, and the following year organized the first synod of the so-called Church of the Desert. He founded a school for the education of Protestant ministers at Lausanne, where he labored diligently until his death. His writings are quite numerous, of which the most important is "An Historical Memorial of the Most Remarkable Proceedings Against the Protestants in France from 1744 Until 1751."

COURT FOOL, the name given in ancient and medieval times to the professional jesters employed at the courts of nobles. It was their duty to enliven the wealthy nobles, particularly at table, by jests and witty sayings. A jester

employed by the King of Persia is mentioned in the writings of Plutarch, but the office of court fool attained its highest reputation in the Middle Ages, when it was customary to employ them, not only for court service, but they became an adjunct in the apartments occupied by the queens and dauphins. The English kings had court jesters up to the time when the last Stuarts ceased to reign, after which the practice of employing them was abandoned. Court fools were clothed in peculiar costumes, made up of gay colors and unusual ornamentation, and they were permitted to use free speech in ridiculing the follies and vices of their contemporaries. They were abolished in France about the time of the Revolution, and ceased to be an adjunct in the courts of Germany and Russia about the same time. Shakespeare uses the court fool in "As You Like It" and "King Lear."

COURTHOPE (kōrt'ŏp), **William John,** author, born in Sussex, England, June 17, 1842. He was educated at Harrow School and Oxford University, where he graduated as master of arts in 1877. He received a prize in 1863 for a poem on "The Tercentenary of Shakespeare," and a gold medal for one on "The Genius of Spenser." He was founder and joint editor of the *National Review* and contributed largely to other publications. His eminent scholarship was displayed in writing many literary productions of high quality. He was appointed professor of poetry at Oxford University. Among his best productions are "The Paradise of Birds," "The Liberal Movement in English Literature," "History of English Poetry," "Works of Alexander Pope," and "Addison."

COURT-MARTIAL (kōrt-mär'shạl), a court authorized in the military and naval service, with jurisdiction to try all offenders in the army or navy. Such a court has no jurisdiction over a citizen who is not employed in the military service. It is made up of from five to thirteen commissioned officers and is presided over by a judge advocate.

COURTS, the tribunals established by law for the administration of public justice. They are composed of one or more judges or justices, and such other officers as the law authorizes. The courts are designated as either *civil* or *criminal,* depending upon the character of the business which they transact. In the civil courts all civil cases are tried, while criminal courts have jurisdiction of public offenses, as felonies and misdemeanors. In some instances the so-called *district courts* have jurisdiction of both civil and criminal cases. Each State of the United States has a supreme court made up of a number of justices, while the United States Supreme Court has the highest jurisdiction regarding cases which involve questions of national jurisdiction. The cases that may be tried in the United States Supreme Court involve issues between states, between individuals and the United States, and between the United States and a particular State. Most of the State supreme courts consist of from five to seven justices, while the United States Supreme Court consists of a Chief Justice and eight associates. In the states they are in most instances elected by popular vote, while those of the United States Supreme Court are appointed by the President with the consent of the Senate.

The Supreme Court of the Dominion of Canada as at present organized was constituted by a statute enacted in 1906. It is composed of a Chief Justice and five puisne judges, and has appellate civil and criminal jurisdiction throughout the Dominion. Each Province has a supreme court, which is presided over by a supreme judge and a number of puisne judges. Locally, as in the United States, there are *district* and *county* courts and courts presided over by the *justices of the peace.* The towns and cities have *municipal* or *police* courts. In England the House of Lords constitutes the high court as well as the supreme legislative body.

COUSIN (kōō-zăn'), **Samuel,** engraver, born at Exeter, England, May 9, 1801; died May 7, 1887. He was apprenticed to S. W. Reynolds, an engraver in London, in 1815, and ten years later began engraving on his own account. His early success was due to his superb production, "Lady Ackland and Her Family." In 1835 he was elected an associate engraver of the Royal Academy, and twenty years later was placed in full membership. His efforts brought good returns, and he was able to bequeath $75,000 as a fund to assist indigent artists. His most noted engravings include "Sir Robert Peel," "Portrait of the Queen," "The Strawberry Girl," "Penelope Boothby," "Marie Antoinette in the Temple," "Bolton Abbey in the Olden Time," and "Time and Mitherless Bairn."

COUSIN, Victor, writer and founder of the Eclectic school of philosophy, born in Paris, France, Nov. 28, 1792; died June 13, 1867. He was educated at Lycee Charlemagne and was made professor at the Sorbonne in 1815. Later he was appointed to several other important institutions of learning, visited Germany in 1817, and subsequently lectured extensively. He was made a member of the council of public instruction in 1830 and a peer of France in 1840. He accepted the office of minister of public instruction in the cabinet of Thiers. His public career ended with the revolution in 1848. His teaching had much influence on public thought in Germany, England, America, and other countries as well as in France. Among his best known books are "History of Philosophy" and "Truth, Beauty, and Good."

COUTURE (kōō-tür'), **Thomas,** artist, born at Senlis, France, Dec. 15, 1815; died March 31, 1879. He attracted early attention by his famous paintings, notably on account of their brilliant coloring. His "Troubadours" sold for 55,000 francs in 1844. He was long an influential member of the Legion of Honor, attained

eminence by his numerous portraits of eminent men, and exhibited a number of his productions in America. Among his principal works are "The Baptism of the Prince Imperial," "The Return of the Troops from the Crimea," and "Two Volunteers of the French Revolution."

COVENANT (kŭv'ĕ-nănt), a stipulation in writing between two or more parties whereby the truth of certain facts is set forth, or an agreement is made to bind one or more of the parties to do or not to do some specific act. The Old and New Testaments contain a number of references to covenants between God and man, which were made by God on certain conditions of repentance, obedience, and faith on the part of man. After the deluge a covenant was made with Noah, and another was concluded for Abraham and his posterity, which was renewed to Isaac. The covenants of the Scriptures which are especially recognized by evangelical writers are the *Covenants of Works* and the *Covenants of Redemption*. All of the former are substantially promises of blessings upon the basis of obedience, while the latter are the New Testament promises of blessings upon the basis of faith in Jesus Christ.

COVENANTERS (kŭv-ĕ-nănt'ĕrz), a term applied to a large portion of the people of Scotland in the 16th and 17th centuries, who bound themselves by covenants to defend the Presbyterian Church against the Episcopal and Catholic churches of Great Britain. Four of these covenants were made. The first was subscribed at Edinburgh Dec. 3, 1557; the second, at Perth, May 31, 1559; the third was the National Covenant and was signed at Edinburgh, Feb. 28, 1638; and the fourth was written by Alexander Henderson and accepted by the Scottish general assembly on Aug. 17, 1643. The last-mentioned covenant was subscribed to by the English Parliament at London on Sept. 25, 1643, and was regarded a league between Scotland and England. Obligation to it was absolved in 1661 and its renewal was prohibited, for the reason that the liberty of the church was deemed safe.

COVENT GARDEN (kŭv'ẹnt), a square of London, famous for its extensive market of flowers and fruits. It formerly belonged to the abbot and monks of Westminster. In 1831 the Duke of Bedford, the proprietor of the ground, erected the present buildings. These buildings include a flower market roofed with glass and a market house which covers three acres of ground. Near it is the Covent Garden Theater, built in 1859, which occupies the site of the former Royal Italian Opera House.

COVENTRY (kŭv'ẹn-trў), a city in the County of Warwick, England, eighty-five miles northwest of London. It was the seat of Parliament during the reign of early monarchs and the residence of a number of them at various times. Saint Michael's church, built in the period between 1230-1395, has a spire 200 feet high. Another excellent edifice is Saint Mary's Hall, erected in the 14th century. It has exquisite tapestry, stained windows, and fine frescoes. A Benedictine monastery was founded at Coventry by Earl Leofric and his wife, Lady Godiva, in 1043. The city is noted for its many historical events, including the story of the trial by battle between the dukes of Norfolk and Hereford, an account of which is given by Shakespeare in his Richard II. Mary, Queen of Scots, was imprisoned here for some time. The city has railroad connections with the principal cities of Great Britain and manufactures of ribbons, bicycles, watches, textiles, and machinery. Among the public utilities are sewerage, public baths, a public library, and electric street railways. It is a brisk market for produce and live stock. Population, 1911, 106,377.

COVENTRY, a town of Rhode Island, in Kent County, twelve miles southwest of Providence, on the New York, New Haven and Hartford Railroad. It is finely situated on the Pawtucket River and has a brisk trade in produce and merchandise. The manufactures include woolen and cotton goods, cigars, clothing, and machinery. Coventry was the home of Nathanael Greene. It was incorporated in 1741. Population, 1905, 5,698; in 1910, 5,848.

COVERDALE (kŭv'ẽr-dāl), **Miles,** eminent divine, born in Yorkshire, England, in 1488; died Feb. 19, 1568. He was educated at Cambridge and became a monk, but changed his religious opinions and worked earnestly in the Reformation. He went abroad as an evangelist in 1532. Three years later he completed his translation of the Bible, which he dedicated to Henry VIII. This Bible was the first to be sanctioned by royal authority in England and is the earliest one printed in the English. The Psalms as translated by Coverdale are still printed in the Book of Common Prayer. He went to Paris in 1538 with the consent of Henry VIII. and Francis I. to superintend a revision of the Scriptures in English, the reason being that work and paper were cheaper and better there than in England. However, the Inquisition interfered, which resulted in the destruction of a large number of copies and some of the material, but the principal portion of the supplies was afterward brought to London. This resulted in bringing out the Great Bible in 1539, called Cranmer's Bible, on account of a preface written by that prelate. Coverdale was elected to the see of Exeter in 1551 but was ejected and thrown into prison two years later, from which he was released in 1555 at the suggestion of the King of Denmark, on the condition that he would leave the country. Coverdale went to Denmark and later to Geneva, where the Geneva translation of the Scriptures was published in 1560 with his assistance. He returned to England on the accession of Elizabeth and in 1564 was appointed to

the rectory of Saint Magnus, London. Coverdale ranks among the most eminent divines of England. His letters and works were published by the Parker Society at Cambridge.

COVINGTON (kŭv'ĭng-tŭn), a city in Kentucky, county seat of Kenton County, at the confluence of the Licking and Ohio rivers, opposite Cincinnati. It is on the Chesapeake and Ohio, the Kentucky Central, and the Louisville and Nashville railroads, and has connections with other cities by a number of electric railways. The chief buildings include the county courthouse, the public library, the post office, the city hall, and the Roman Catholic cathedral. It has a German orphan asylum, a hospital and foundling asylum, and the Notre Dame Academy. Among the principal industries are flouring mills, breweries, distilleries, tobacco and cigar works, and carriage, wagon, and machine shops. It has a number of pork packing houses, silk factories, and glass works. The city has an extensive electric street railway system, sewerage, electric and gas lights, paved streets, waterworks, and a large trade. Two bridges cross the Ohio River, one of which is a suspension bridge, 2,255 feet long, erected at a cost of $2,000,000. Covington was settled in 1812 and incorporated in 1834. Population, 1900, 42,938; in 1910, 53,270.

COW, the female of the genus bos or ox, of which the bull is the male. It has been bred so as to obtain marked differences in color, size, and utility. Among the best kinds of beef cattle are the Galloway; for general purposes, the Hereford, Durham, and Holstein; and for dairying purposes, the Ayrshire, Jersey, and Guernsey. See **Cattle.**

COWBIRD, or **Cow Bunting,** a bird of North America, belonging to the blackbird family. It deposits its eggs, like the cuckoos, in



COWBIRD.

the nests of other birds. Here they are incubated and the young are reared by their foster parents. The cowbird is brownish-black, about seven inches long, and migrates toward the south to spend the winter. In the spring it moves northward into Canada as far as Hudson Bay and in autumn, usually in September, large flocks are seen associated with other blackbirds. It has a tendency to go with cattle, probably to secure the worms and insects which attend the animal.

COWHAGE (kou'hâj), or **Cowitch,** the hairs on the pod of a tropical climbing plant of the bean family, native to the East and West Indies. The hairs are brownish in color, stiff, brittle, and short, and easily penetrate the skin when coming in contact with it. They produce an intolerable itching, which, instead of being relieved by rubbing, is greatly increased. Cowhage is employed in medicine as a mechanical vermifuge, being taken in syrup and honey. The plant belongs to the genus *Mucuna,* but is commonly called cowhage.

COWLEY (kow'lĭ), **Abraham,** poet, born in London, England, in 1618; died July 28, 1667. His education was obtained at Winchester and Cambridge. He secured inspiration at an early age by the poetry of Spenser, and published an edition called "Poetic Blossoms" at the early age of fifteen years. His distinction at Cambridge was based on his elegant style in the translation of the "Davideis," an epic poem in four parts, which he did not fully complete. He was ejected from college in 1643, after securing a degree of master of arts, on account of being attached to the Court party. He followed the queen to Paris in 1646 and corresponded with King Charles in cipher letters. After the Restoration he was disappointed in an ambition to obtain the mastership of the Savoy, and subsequently retired to the queen's lands at Chertsey, of which he secured a lease. Among his best known works are "Mistress" and "Pintarique Odes." Though little read at present, his poetry is regarded equal to Spenser's and Shakespeare's. His brilliancy is of the sort that tends to rise into eminence by high ascent, rather than by a shining luster. Among his works in prose are several essays that rank in sublimity with the works of Milton.

COW PARSNIP (pärs'nĭp), a large plant of the parsnip family, native to the Northern Hemisphere. It is cultivated in the temperate regions of Europe. In Scotland, where it is a rank weed, it is called *kiesh.* The tall branching stems grow to a height of two to five feet and bear white flowers in broad umbels, and the herbage is used as fodder. About fifty species have been classified, of which the *Siberian* is the largest, but its stem is quite coarse. Several species are common to Canada and the United States, and locally they are called *wild celery.* The Eskimos peel the leaf stalks and use them as food.

COWPENS (kou'pĕnz), a village of Spartanburg County, South Carolina, near which the Americans under Gen. Morgan defeated the British under Col. Tarleton, Jan. 17, 1781. Cornwallis sent Tarleton with 1,110 men against Morgan, when the latter took a strong position at Cowpens under the slope of a hill. His militia was stationed in front, the reg-

ulars on higher ground, and at the top of the slope was Col. Washington with the cavalry. The British made the attack and met with a deadly volley, after which the regulars opened a stormy fire and followed by a bayonet charge. At the same time the American cavalry struck the right flank of the British and the militia formed again behind the lines and effected a rout. The British lost 230 killed and 600 prisoners, while the American loss was only seventy-two. This battle was one of the most brilliant of the war, when considered in point of tactics.

COWPER (kōō'pĕr), **William,** poet, born at Hertford, England, Nov. 26, 1731; died April 25, 1800. His father was chaplain to George II. and married Ann, the daughter of Roger Donne, who died while William was a child. He was educated at Westminster and studied for the law in London. Though admitted to the bar in 1754, he never practiced. His family connections caused his appointment as clerk of the House of Lords, but he refused to appear for examination at the bar of the House on account of nervousness and resigned his office, and soon afterward became mentally affected. He remained under the care of a doctor at Saint Albans for three years, beginning in 1763, and was restored to health by the efficient treatment of Dr. Cotton. In 1776 he commenced a poem on the "Progress of Error" and in 1781 published "Table-talk, Truth, and Expostulation."

Cowper formed the acquaintance of Lady Austin in 1781, who suggested to him "The Task," persuaded him to translate Homer, and related to him the history of "John Gilpin." He commenced work on "The Task" in 1783 and published it in 1785, together with "Tirocinium," the two appearing in one volume. His translation of Homer appeared in 1791, and this, together with other works, gave him the reputation of being the greatest poet of his day. In 1794 he was again affected with mental weakness and could not successfully carry forward the work of writing. His friend, Mrs. Unwin, also lost her mental faculties, and both were groping under the same difficulties of mental affliction. He was attacked by dropsy in 1799 and died the following year. Cowper greatly beautified the English literature. He added many charms by his epistles and anecdotes and was a charming letter writer. Two of his most delightful poems, "My Mary" and "Address to My Mother's Picture," were written in the last gloomy days of his life.

COWPOX, an acute contagious disease affecting the teats and udder of cows, characterized by slight fever and an eruption of the skin of the affected parts. The matter contained in the vesicles is the vaccine virus used to inoculate the human system as a security against smallpox. It was first introduced for this purpose by Dr. Jenner (q. v.).

COWRY (kou'rў), or **Cowrie,** a kind of mollusks found chiefly in the warm seas of the Eastern Hemisphere. Several of the species are noted for the beauty of their shells, which are used extensively in many parts of Southern Asia for money and as ornaments. They differ in value according to the size and the coloring of their surface. Many tons of cowries are gathered annually in the islands southeast of Asia, particularly in the Philippine Islands and the East Indies. Specimens with beautiful markings upon their smoothly polished surface are popular for ornaments to the dress and habitations of both civilized and uncivilized nations.

COWSLIP, the name of several species of plants which belong to the same genus as the primrose and oxlip. There is a close resemblance between the cowslip and the oxlip. The flowers are delicate, possess marked beauty and fragrance, and are general favorites. In color they are greatly variegated, including white, yellow, and rose-colored bloom. The cowslip has a spreading flower cluster, in this respect differing from the common primrose. Its clusters of flowers have been called *fairy cups* for the reason that they were long thought to be the haunts of fairies. Many species of cowslips are well-known plants in Europe and America. One of the American species is known as the *shooting star.*

COW TREE, a class of trees native to the tropical regions, so called from the milky juice which is used as a food. The milky product is not the juice of the plant, but is derived from certain cells found in the stems, known in botany as the laticiferous vessels. It has the appearance of the milk of a cow and is wholesome as a food, and the natives use it in the regions where the trees are indigenous. The cow tree of Guiana and Venezuela grows to a height of 80 to 100 feet and has leathery leaves of a large size. The product is obtained by making incisions in the trunk of the tree.

COX (köks), **David,** landscape painter, born at Deritend, near Birmingham, England, April 29, 1793; died June 15, 1859. He was the son of a blacksmith and began the work of a scene painter at an early age. In 1804 he removed to London to study art under John Varley, and in 1813 joined the Society of Painters in Water Colors. He taught drawing in Hereford and several other places a number of years, but after 1827 resided chiefly in London. His early paintings consist mostly of scenery in Wales and England. Faithfulness to nature and accurate treatment of light and shade are characteristics of his productions. They include "Hay Field," "Ulverston Sands," "Bolton Abbey," and "The Vale of Clwyd."

COX, Jacob Dolson, statesman, born in Montreal, Can., Oct. 27, 1828; died in 1900. In 1829 he was taken to New York by his parents, who afterward removed to Ohio. He studied at Oberlin College, taught school and practiced law, and in 1859 was elected to the State Sen-

ate. In 1861 he was appointed brigadier general of volunteers for service in the Civil War. He served with McClellan in 1861-62, and subsequently saw service in Ohio and with Sherman in Georgia. After the close of the war he was elected Governor of Ohio as a Republican, became Secretary of the Interior in 1869 and was elected to Congress in 1877, serving one term. In 1881 he was made dean of the law school of Cincinnati University and in 1885 became president of that institution. He published a number of volumes on the military history of the Civil War.

COX, Kenyon, painter, born in Warren, Ohio, Oct. 27, 1856. He studied in Cincinnati and Philadelphia and in 1877 went to Paris, where he received instruction under Gérôme and Carolus Duran. In 1882 he returned to America and was made a member of the Society of American Artists in New York City. His productions consist largely of portraits and figure pieces. A portrait of the sculptor Augustus Saint-Gaudens and a picture entitled "An Eclogue" are his best known works. Specimens of his pictures are in the Library of Congress, Minnesota State capitol, and in many other places. His wife, Louise Cox (b. 1865), has a reputation as a figure painter.

COX, Palmer, artist and author, born in Granby, Quebec, April 28, 1840. He graduated at Granby Academy and removed to San Francisco, Cal., in 1863, where he contributed to a number of periodicals. In 1875 he removed to New York City. His writings are very numerous and are illustrated by pictures drawn by himself. They include "Squibs of California," "Queer People With Wings and Things," "The Brownies at Home," "How Columbus Found America," "The Brownies in Fairyland," and "The Brownies in the Philippines."

COX, Samuel Sullivan, statesman, born in Zanesville, Ohio, Sept. 30, 1824; died Sept. 10, 1889. He graduated at Brown University in 1846, and became editor of the *Statesman* at Columbus, Ohio, in 1853. Owing to a flowery description of a sunset which he published in his paper, the sobriquet of *Sunset* clung to him through life. In 1856 he became secretary of legation at Lima, Peru, and was a member of Congress from 1857 to 1865. He removed to New York City and was elected to Congress in 1868 and subsequently was reëlected three times. In 1872 he was elected as a Congressman at large for the State and as such served consecutively for ten years. In 1885 he was made minister to Turkey, returned to the United States the following year, and was again elected to Congress and twice reëlected, serving until the time of his death. The life-saving service was founded by him, and he was the author of a number of works on political subjects. His ability as a debater and humorist made him many friends. Among the best known books from his pen are "Why We Laugh," "Eight Years in Congress," "A Buckeye Abroad," and "Three Decades of Federal Legislation."

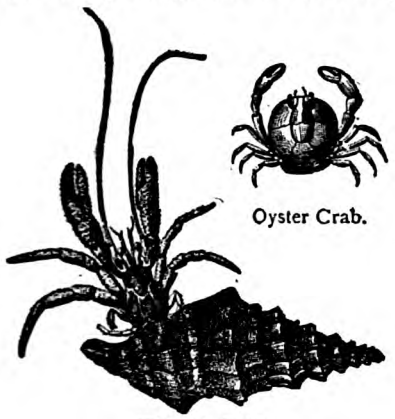
COXE (kŏks), **Arthur Cleveland,** clergyman, born at Mendham, N. J., May 10, 1818; died July 20, 1896. He studied at the General Theological Seminary, took orders in 1841, and became clergyman the following year. He was rector of Saint John's Church in Hartford, Conn., from 1843 to 1854, and then was called as rector to Grace Church in Baltimore. In 1863 he accepted the rectorship of Calvary Church in New York City, and the following year became assistant bishop of western New York. He succeeded to the position of second bishop of western New York in 1865. He published extensive works in verse and prose, founded the Christian Literature Company, and edited their series of "Saint Augustine on the Psalms" and "Ante-Nicene Fathers." His later works include a poem called "Westminster Abbey" and one entitled "Episcopate of the West." As a lecturer he took high rank and was engaged as such by several institutions, including the University of Michigan and Kenyon College.

COXEY, Jacob Sechler, labor agitator, born in Pennsylvania, in 1854. He commenced his life work at the age of thirteen years in a rolling mill, became owner of a sand quarry at Massillon, Ohio, in 1881, and enlarged his operations by becoming a horse breeder in 1889. At first he supported the Greenback party, but later became a Populist and attended the national convention in Saint Louis. He advocated the issue of $500,000,000 in bonds by the government to be used in promoting good roads and internal improvements. For the purpose of promoting this scheme he marched with the Commonweal army, consisting of 350 men, from Massillon to Washington, D. C. On arriving at Washington he made a demonstration from the steps of the capitol and was arrested for trespassing on the grass. After being lodged in jail, his army dwindled away, but it was imitated in various regions of the country. He was a candidate for Congress for one of the districts of Ohio in 1896.

COYOTE (kī'ō-tē), the prairie wolf common to the plains of the United States and the central part of Canada. In size it ranges between the fox and the ordinary wolf. It has a sharp snout and coarse, yellowish-gray fur mixed with black. The coyote is about forty inches long, with a tail sixteen inches. It has a prolonged howling cry.

CRAB, a class of ten-footed crustacean decapoda, of which the edible crab is a type. They have a short tail, which is folded under the body, short feelers, and a wide shield on the back for protection. In the mouth are several pairs of strong jaws, and the stomach is studded with hard projections that serve for grinding the food. A colorless lymph is propelled to the gills by the action of the heart, the

liver is a rich yellow substance, and the edible portions are contained in the front claws, which are much larger than the other legs. Among the widely distributed species are the *oyster crab*, the *hermit crab*, the *blue crab*, and the *spider crab*. The crab is found in the waters near the shore, though there are several species



Oyster Crab.

HERMIT CRAB.

that live on land. A species called the *swimming crab* is a fast runner, burrows in the ground, and is fond of fruits. The claws of the males are much larger than those of the females, and for this reason the former bring the higher price in the market. In a natural state the color is reddish-brown above and whitish beneath; the reddish color seen when in the market is produced by boiling.

The larger crabs in warm climates often weigh about ten or twelve pounds. They are caught in immense numbers off the coast, both in Canada and the United States, and are sold on the market as a delicacy. The front pair of limbs does not serve for locomotion, but answers the purpose of defense and for strong claws and pincers. All species of crabs molt periodically, that is, they throw off their calcareous covering. In the molting period the crab is quite helpless for several days, after which a new covering takes the place of the old one. Their claws are easily lost, but grow anew after a short time. The eyes are movable and they are capable of seeing well and at great distances. The land crabs go into the water to spawn. Some species live in fresh water, though the larger crabs are found in the sea and salt waters. Their food consists of dead and living animal matter, but some subsist on vegetable substances, such as the *racer crabs* of the West Indies, which live on the juices of the sugar cane. Crab fishing is an important industry in most countries, particularly in the densely populated regions, where many laborers are employed in crab and other shell-fish fisheries.

CRABBE (krăb), **George,** poet, born in Suffolk, England, Dec. 24, 1754; died Feb. 3, 1832. He manifested a passion for reading at an early age and was decidedly biased toward poetry. After securing an elementary education, he was apprenticed to a surgeon, but developed no liking for the profession, and proceeded to London in 1780 to make a trial of literature. His entire fund consisted of £3, which he soon spent and was threatened with arrest for debts. Applying to Burke for assistance, his troubles were soon alleviated and his needs fully supplied. At the suggestion of this gentleman several alterations were made in his two productions, "The Library" and "The Village," and published in 1781. He became a clergyman, but remained busy as an author. Among his most celebrated productions are "The Parish Register," "The Newspaper," "Tales in Verse," and "Tales of the Hall." He was a tireless worker, ever busy with his pen, and ranked well among the writers of his time.

CRABTREE, Charlotte, actress, born in New York City, in 1847. She began her career as an actress in California at the age of ten years, and in 1860 played successfully in New York and other eastern cities. Her reputation was greatly enhanced by playing as *Little Nell* and the *Marchioness* in "Old Curiosity Shop," which parts she played successfully in 1867. Other rôles in which she attained success were in "The Firefly" and "The Little Detective," in which she won applause from great audiences. Her stage appearance was natural and graceful. She retired from the stage in 1881, after acquiring a fortune.

CRACOW (krā'kō), or **Krakow,** a city in Austria-Hungary, on the Vistula River, 256 miles northeast of Vienna. The streets are well improved by grading and stone and asphalt pavements. It has an important river navigation and railroad trade and a line of important manufactures. Among the ancient and noted buildings are a Gothic cathedral, a library with over 300,000 volumes, and several monuments of Polish kings. The monument of Kosciusko is located near the city, on an eminence, and is 120 feet high. It is the seat of a famous university with 2,500 students. The manufactures include clothing, cigars, textiles, leather, machinery, and earthenware. Cracow is well fortified by strong walls. It was the ancient capital of Poland and the residence of the Polish kings. Since 1846 it has belonged to the crown of Austria. Population, 1910, 150,318.

CRAIGIE (krāg'ĭ), **Pearl Richards,** novelist, born in Boston, Mass., Nov. 2, 1867; died in London, England, Aug. 13, 1906. She was taken to England by her parents when an infant. She studied under private tutors and in institutions in Paris and London, and in 1887 married Reginald Walpole Craigie, from whom she was afterward divorced. Her writings are very numerous and she is known chiefly by her pen name of *John Oliver Hobbes*. Among her best known plays are "The Ambassador," "A Repentance," and "Journeys End in Lovers' Meet-

ing." Her other writings include "A Study in Temptations," "A Bundle of Life," "Love and the Soul Hunters," "The Serious Wooing," "Tales About Temperaments," and "The Gods, Some Mortals, and Lord Wickenham."

CRAIK (krāk), **Dinah Maria Mulock,** novelist, born at Stoke-upon-Trent, England, in 1826; died Oct. 12, 1887. "The Ogilvies," her first novel, appeared in 1849 and met favorable reception. The money that came from her early writings was used to support her invalid mother and ten younger brothers. She is best known by her "John Halifax, Gentleman," a work translated into German, French, Russian, Greek, Italian, Spanish, and other languages, and which is regarded among the most popular writings of the last century. Her novels, poems, and essays include forty-six productions, of which the best known are "Mistress and Maid," "Fugitive Poems," "A Life for a Life," and "Agatha's Husband."

CRAIK, Robert, physician, born in Montreal, Canada, April 22, 1829. He studied medicine at McGill University, and in 1854 became house surgeon general in the hospital at Montreal. Two years later he was made demonstrator of anatomy at McGill University, became curator of its anatomical museum in 1859, and held the chair of clinical surgery in that institution from 1860 to 1867. Subsequently he was an instructor in chemistry and in 1889 became dean of the medical faculty, which position he held until 1901. He was honored by being elected a member of many scientific associations. Among his works are "Strychnia in Cholera," "Medical Education," "Nature of Morbid Poisons and Germ Theory of Disease," "Hospital and District Nursing," and Papers on Purpura and Tetanus."

CRANBERRY (krăn'bĕr-rỹ), a plant common to the swampy regions of the Temperate and Arctic zones. The plant is a creeping vine with ovate, evergreen leaves, a terminal single-flowered peduncle, and a berry of a dark red color, about one-fourth of an inch in diameter. Several species are cultivated for the market. They thrive best in natural bogs or swamps that can be drained and flooded by ditches when desired. They are propagated by cuttings set in rows about fourteen inches apart, and the ground is covered by about three inches of sand to retain the moisture of the soil below and permit of greater ease in cultivation. The berries are gathered by hand. Their principal use is for pies and preserves. They are exported in large quantities from the United States, Canada, and Russia.

CRANE (krān), any bird of the genus *grus.* It differs from the storks and herons in having its hind toe higher than the front ones and in caring less about wet and marshy regions. All the species have long legs and a long neck, powerful wings, and a prominent bill, and are of considerable size. The length of the body is about forty-five inches. The plumage is usually ash-gray, but in some species it is white or bluish. Cranes are migratory, passing north in the spring in large wedge-formed flocks, led by single leaders, or in a long single line, and issue a discordant cry. They usually alight for food in daytime and fly continuously by night until their destination is reached. Their nests are made in rushes, in which two eggs are laid. The young are quite helpless and need to be fed for several days. The food consists of insects, worms, roots, snakes, seeds, and small quadrupeds. Their means of defense lies in the bill, which serves as a dagger. The flesh of some species is regarded an excellent food, for which they are hunted. The *crowned crane* inhabits the northern and western portions of Africa. It has a tuft of slender yellow feathers on the head, which it is able to move at will, and is of a bluish, ash-gray color. The *demoiselle crane* has two tufts of feathers formed by an elongation of the ear coverts, and inhabits Central Asia and Africa. The *whooping crane* and *sandhill crane* are native to North America.



CROWNED CRANE.

CRANE, Stephen, novelist, born in Newark, N. J., Nov. 1, 1870; died in Baden, Germany, June 5, 1900. He was educated at the Syracuse University and Lafayette College, where he studied in a desultory manner, and at the age of sixteen years became a newspaper reporter. His first publication was "Maggie, a Girl of the Streets," which had little sale, but was afterward called to public notice by critics and republished. His next work was the "Red Badge of Courage" and attracted no particular attention until it was reprinted in England, when it became exceedingly popular. In it is depicted the career of a raw recruit confronting the shot and shell of the enemy. So vividly is this described that the reader becomes imbued with an extraordinary admiration. He went to Europe and reported the War of 1897 between Greece and Turkey for the newspapers, and afterward reported the war news of Cuba, particularly the campaigns made by the Rough Riders at El Caney and San Juan. These reports were sent largely to the New York *World* and the New

York *Journal*. His books include "George's Mother," "The Monster," "An Old Man Goes A-Wooing," "The Little Regiment," "The Third Violet," and "War is Kind." Though he died at an early age, he was well known to the reading public.

CRANE, Walter, painter and engraver, born in Liverpool, England, Aug. 15, 1845. He first studied under his father, Thomas Crane, a painter of portraits, and subsequently received instruction under W. J. Linton in London. His first work consisted of illustrations in a book entitled "The New Forest," exhibited at the Royal Academy in 1862. He is known extensively as an illustrator of juvenile books in an antique style, but produced many designs in tapestry and for glass windows, and wrote extensively on various subjects of artistic interest. Many medals were awarded to him and he was for some time president of the Arts and Crafts Society of London. His oil paintings include "Birth of Venus" and "Fate of Prosperine." Among his publications are "Claims of Decorative Art," "A Wonder Book," "Queen Summer," and "The Bases of Design." His principal decorations include friezes, panels, and modeled ceilings and fireplaces. He died March 15, 1915.

CRANE, Winthrop Murray, public man, born in Dalton, Mass., April 23, 1853. He attended the public schools and became a manufacturer of paper. In 1897 he was chosen Lieutenant Governor of Massachusetts, serving until 1899, and in 1900 was elected Governor of the State. He was appointed, in 1902, as United States Senator to fill the vacancy caused by the death of George F. Hoar, and in 1907 was elected for a full term. He ranks as an influential legislator and served on a number of important Congressional Committees.

CRANIAL NERVES. See **Nerves.**

CRANIUM (krā'nĭ-ŭm), the bony case containing the brain. It is composed of eight bones, the occipital, ethmoid, sphenoid, frontal, two parietal, and two temporal. These bones form a spheroidal inclosure which offers substantial resistance to external violence. The cranium and face constitute the skull (q. v.).

CRANMER (krăn'mĕr), **Thomas,** Archbishop of Canterbury and church reformer, born in Aslacton, England, July 2, 1489; suffered martyrdom March 21, 1556. He descended from a Norman family and studied at Cambridge, where he became a fellow in 1510. His study was largely of the learned languages, the Scriptures, and the writings of Luther, Erasmus, and Le Fevre. He secured the degree of doctor of divinity in 1523 and received an appointment as lecturer in theology. In 1533 he was appointed Archbishop of Canterbury and zealously promoted the cause of the Reformation. His efforts led to the translation of the Bible into English, its reading in the churches, and the vigorous suppression of monastic institutions. He was appointed one of the council of regency to Edward VI. by the will of Henry VIII. He joined the partisans of Lady Jane Grey in the exclusion of Princess Mary from the crown by the will of her brother. When Mary ascended the throne, he was condemned for treason and sent to the Tower. The burning of Latimer and Ridley at Oxford caused him to write six recantations. He was tried on charges of perjury, blasphemy, heresy, and incontinence, was degraded, and burned at the stake. Although having shown weakness in signing the recantations, his courage returned later, and he died protesting innocence and unworthy weakness, showing fortitude in the midst of the flames.

CRANNOGS (krăn'nŏgs), the fortified lake dwellings found in Ireland and Scotland. These fortifications were constructed in about the 9th century, and were discovered in 1813 by George Chalmers, the author of "Caledonia." Several hundred have been located. The weapons and utensils found in them are of stone, bronze, and iron. They consist mostly of swords, knives, axes, daggers, spears, and whetstones.

CRANSTON (krăn'stŭn), a town of Rhode Island, in Providence County, on the New York, New Haven and Hartford Railroad. It is a popular residential center of Providence business men, has a number of libraries, and is well supplied with public utilities. Among the public institutions are an almshouse, an insane asylum, a State prison, and an industrial school for boys and girls. The manufactures include cotton and woolen goods, clothing, machinery, and spirituous liquors. The first settlement at Cranston was made in 1638 and its incorporation dates from 1754. Population, 1910, 21,107.

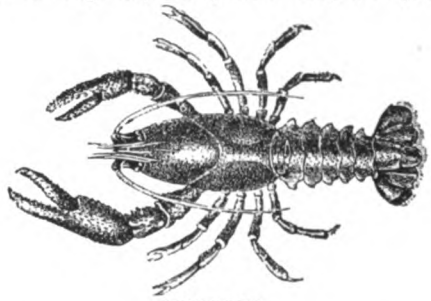
CRAPE (krāp), or **Crêpe,** a delicate transparent fabric, made of raw silk which has been tightly twisted. It is either crisped or smooth, but all kinds of crapes are woven and dyed with the silk in the raw state. The silk used in making crisped crape is spun harder than for the single, or smooth kinds. Gum water is used to stiffen all classes after they are finished. The colors are black and dark brown, and the former is used extensively as mourning apparel. Many countries of continental Europe excel in the manufacture of crape, especially France and Italy. The crapes made by the Chinese and Japanese are white or highly colored, when intended for mourning, but the varieties used in trimming hats and for ladies scarfs are made in standard colors.

CRASSUS, Marcus Licinius, Roman triumvir, born in 115 B. C.; slain in 53. His immense wealth caused him to be surnamed Dives. In 83 he joined the party of Sulla, was elected praetor in 71, and the following year became consul with Pompey, his enemy. While consul he spread 10,000 tables in a feast and distributed a provision of corn for three months. In 60 B. C. he formed the first triumvirate with Caesar and Pompey. He was reëlected consul five years later, gained the province of Syria, and

led a campaign against the Parthians, but, misguided by a treacherous Arab, he was defeated and slain.

CRATER (krā'tēr), the bowl-shaped depression forming the outlet of a volcanic vent. It is generally circular in form and surrounded by a cone of débris. A fissure in the earth is the beginning, through which great volumes of steam and other gases are evolved, the shattered lava forming the volcanic cone. There may be several openings, or the escape may be by long fissure instead of the usual form. The craters of extinct volcanoes often form lakes. The most remarkable one is Crater Lake, in Klamath County, Oregon. It is 6,240 feet above the sea, 2,000 feet deep, and surrounded by great cliffs from 1,200 to 2,000 feet above its surface. Springs are the source of its water supply and it has no outlet to the sea.

CRAWFISH (krą'fĭsh), or **Crayfish,** the name of several species of fresh-water crustaceous animals resembling the lobster in appearance. About thirty species are native to America, where they are popularly called *crabs.* They have a long tail, ten jointed feet, and prominent feelers. The body is divided into two parts, the trunk and a long, six-jointed tail. The eggs are fastened to the legs of the mother, from which the young escape and molt several times before reaching maturity, which requires from three to four years. It is thought the molting occurs largely because the shell does not enlarge with the growing body. When the shell comes off the animal is quite helpless and exposed to many dangers, often causing fatal results. Large numbers of crawfish may be seen in sluggish streams and bodies of fresh water. They burrow in the ground near the water, and during the winter live in a semi-dormant state. Their food consists of worms, insects, small carrion, and the tender forms of vegetation, and they even attack each other for food. They are widely distributed on the continents and islands. The larger species are considered dainty food; the tail and claws being the edible parts. The burrowing habits of some cause damage to levees and milldams on a number of streams, particularly on the Mississippi.



CRAWFISH.

CRAWFORD (krą'fērd), **Francis Marion,** American writer, born at Bagni di Lucca, Italy, Aug. 2, 1854. His father was the celebrated sculptor, Thomas Crawford. He was liberally educated in America, Italy, Germany, and England. In the last mentioned country he attended Cambridge and then studied two years at Karlsruhe and Heidelberg, Germany, after which he studied Sanskrit at Rome. He went to India in 1879 and published the *Indian Herald* at Allahabad. In 1881 he returned to America, remaining two years, and subsequently he made his home near Sorrento, Turkey. His writings show much power and have been of uniform interest. The style is manly; the originality, marked; and the versatility, surprising. Some of his productions are devoted to critical philology and philosophy, though most of them relate to fiction. Among the best known are "Mr. Isaacs," "The American Politician," "With the Immortals," "Children of the King," "Story of a Lonely Parish," "Casa Braccio," "Marion Darche," "Katherine Lauderdale," "Zoroaster," "Marzio's Crucifix," and "The Ralstons." He died April 9, 1909.

CRAWFORD, Thomas, sculptor, born in New York, March 22, 1814; died Oct. 10, 1857. His early taste for art caused him to carve in wood. When nineteen years old, he entered a studio of monumental sculptors in New York, and the next year went to Rome and studied under Thorwaldsen. He made Rome his home, but paid several visits to his native land. His studio at Rome was attractive and showed proof of his persistent activities. In the latter years of his life he was deprived of his sight from the effects of a tumor. Among his most noted works are the Washington monument at Richmond and the statue of liberty on the dome of the national capitol at Washington. Besides these, he produced "Babes in the Woods," "Orpheus Entering Hades in Search of Eurydice," and a large number of statues of eminent men, including Beethoven and Henry Clay.

CRAWFORD, William Harris, statesman and lawyer, born in Nelson County, Virginia, Feb. 24, 1772; died in Elberton, Ga., Sept. 15, 1834. He was admitted to the bar in 1798 and appointed with Horatio Marburg to revise the laws of Georgia. In 1802 he was elected to the Legislature and four years later became a member of the United States Senate. He declined the office of Secretary of War in President Madison's Cabinet in 1813, but was appointed minister to France and became an intimate friend of Marquis de Lafayette. In 1815 he returned to the United States and was appointed Secretary of the Treasury, serving during both terms of Monroe's administration, after which his name was presented for the office of President. The other candidates were Andrew Jackson, Henry Clay, and John Quincy Adams. Crawford received the support of four states. He returned to Georgia after the election and was made judge of the northern circuit of that State in 1827, holding the office until his death.

CRAWFORDSVILLE, county seat of Montgomery County, Indiana, about thirty miles northwest of Indianapolis, on the Big Four, the Terre Haute and Indianapolis, and other railroads. It is surrounded by a fine farming country. The noteworthy features include the courthouse, the public high school, and Wabash College. Among the manufactures are flour, ironware, boilers, clothing, cigars, buggies, machinery, and furniture. It has sewerage and waterworks systems. The first settlement was made in 1822 and it was incorporated in 1865. Population, 1900, 6,649; in 1910, 9,371.

CRAYON (krā′ŏn), a pencil made of chalk, charcoal, or pipeclay, colored with various pigments and used for drawing on paper or other materials. Chalk is used largely in the manufacture of blackboard crayons, such as are in common use in schools, and lampblack and pipeclay supply the chief materials in making black crayons. Litmus, turmeric, and saffron are among the vegetable colors used as materials in making pastel, a mixture of chalk and coloring pigments. Crayon painting is practiced to some extent as an art, its chief advantage being in the facility with which it is executed and the richness in outline and coloring.

CREAM, the light yellow substance which rises to the surface of milk after standing a brief time. It is rich in fat, which ranges from ten to seventy per cent. Good cream for household use contains from eighteen to thirty per cent. of fat. Milk is creamed by two methods, that is by setting and by a separator. In the former the milk is usually placed in shallow pans and the cream rises gradually to the surface by gravity, owing to the fact that the fat globules of the cream are lighter than the water and other constituents of the milk. It requires about twenty-four hours for the cream to rise, but the milk must be set immediately after it is drawn, and the loss of fat by this method ranges from ten to twenty per cent. A better way is to put the milk in cans about eighteen inches deep, which are placed in cold water with a temperature of about forty degrees, which causes the cream to rise more rapidly and completely than under a higher temperature. The cream separator has superseded the shallow and deep setting of milk to a large extent, even among farmers, and is in general use in creameries. In this machine the cream is separated from the milk by centrifugal force, the work being done by a bowl or drum which revolves at the rate of 5,500 to 8,000 times per minute. A good separator well operated separates practically all of the cream from the milk, not more than 0.1 per cent. remaining in the skim milk.

CREAMERY (krēm′ĕr-ў), a factory at which butter is made from the milk or cream of cows. Creameries are now operated in practically all sections of the country where dairy farming is profitable. In farming communities they are conducted largely on the coöperative plan, under which the patrons themselves build and operate the plant and share equally in the profits. Under this form of organization the company may or may not buy milk or cream in addition to the product obtained from the stockholders, though usually more or less of the material is purchased. Another form of operating creameries is the plan under which a company or corporation purchases all the material, which is gathered by teams sent out from the plant or is delivered direct from the farms. The value of cream and milk is determined by a tester at the time the products are delivered. Skim milk is a by-product and is either sold or returned to the patrons, who use it to feed pigs and calves. Butter is the chief product obtained from creameries, but in some localities the milk is condensed and canned, and in others cheese is made as a by-product. Colleges of agriculture and government experiment stations have been potent factors in stimulating interest in the manufacture of butter of a high quality.

CREAM OF TARTAR, a bitartrate of potassium, which is obtained from a variety of food products, especially from the tamarinds and grapes. It is contained in the crude tartar or argol which collects as a crystalline deposit upon the bottom and sides of wine casks during the fermentation of the wine. To prepare it for commercial purposes, the argol is dissolved in hot water and the coloring matter is removed by clay or egg albumen, after which the cream of tartar is separated by crystallization. The commercial product is a white crystalline compound, is soluble in water, and contains a small per cent. of calcium tartrate. It is used in making baking powder, in medicine as a purgative, and for various purposes in the arts.

CREASY (krē′sĭ), **Sir Edward Shepherd,** historian, born in Kent, England, in 1812; died in London, Jan. 27, 1878. He was educated at Eton and Cambridge and became a fellow at the latter in 1834. In 1837 he was admitted to the bar, practiced law for more than twenty years, and presided as assistant judge at Westminster court for some time. He was knighted in 1860 and appointed Chief Justice of Ceylon. Among his principal works are "Fifteen Decisive Battles of the World," "History of the Ottoman Turks," "Invasion of England," and "Rise and Progress of the British Constitution."

CRÉCY (krĕs′sĭ), a small town in the department of Somme, France, about 100 miles north of Paris. It is celebrated on account of a battle on Aug. 26, 1346, between Edward III. with 30,000 men and an army of 100,000 French led by the Count of Alençon. The battle resulted in a victory for the English. About 30,000 French were slain, among them the blind King of Bohemia, who was assisting the French army. This battle was one of the earliest in which the English used cannon.

CREDIT (krĕd′ĭt), in economics, the trust or confidence placed by one individual in an-

other, when he assigns money or other property in loan without stipulating for immediate payment. It is a postponement of the payment of a debt to a future time. Credit is given by the party that lends and obtained by the one who borrows. The credit system is based on the confidence the people have in the general solvency, honesty, and resources of others. It is a very important factor in the exchange and production of wealth. The man who is able and willing to work often has few resources, but, with credit extended to him, his ability becomes enlarged and his usefulness is correspondingly widened. Many men have much ability as organizers, but without borrowed capital they are unable to engage in commercial or industrial enterprises. Thus, the noncapitalist is generally benefited by an extension of credit, and the quality and quantity of his productions become vastly enhanced. On the other hand, the capitalist is likewise benefited by the credit system. Without it all his resources would remain in his own hands, and he would incur undue liability in endeavoring to manage all of them himself. Professional men and women, estates, and aged people often have means that they cannot well invest or manage in their own enterprises, but by the credit system others may be assisted while they themselves obtain profit. Banking, railroad construction, the development of a new country, and the material business interests are all more or less dependent upon a general credit system.

Another form of trust is the public credit of a nation. It is based upon the confidence the people have in the expressed or implied promises the government makes to meet public obligations or payments. National credit is represented in bonds, postal money orders, and the credit element in the paper currency and subsidiary coins. No nation has been able to remain out of debt for a long time, or to successfully manage its affairs without drawing upon future possibilities. This element in the credit system applies equally to the subdivisions of the governments, as in the states or provinces, counties, and municipalities. For this reason the public confidence is vital as an element in the success of a state as well as in the enterprises of an individual.

CRÉDIT MOBILIER (krā-dē' mō-bē-lyā'), the name applied to a financial institution organized under the laws of France in 1852. Its purpose was to promote industrial enterprises of various kinds, among them the building of canals, construction of railroads, sinking of mines, and other vast projects. By the terms of the law the institution was authorized to hold shares in public companies and to meet payments by resorting to its own obligations. The operations conducted by this association assumed a very extensive scale. In 1854 large subscriptions were made to the Grand Central Railroad Company and the General Omnibus Company of Paris, and several large loans were negotiated with the government. At first a dividend of twelve per cent. was paid. In 1855 the dividend was forty per cent., while the next year it was reduced to twenty-two per cent., and the following year to five per cent. Owing to public mistrust, the speculative features were greatly curbed and the operations were lessened until the scheme failed totally.

CRÉDIT MOBILIER, a joint-stock company organized in the United States, in 1863, and which gave rise to a great congressional scandal known by the same name. The scandal was the result of attempts at bribery and corruption in connection with the construction of the Union Pacific Railroad from Omaha to the Pacific coast. The company at the time of organizing had a capital of $2,500,000. The charter of this company was sold in 1867 to a company which undertook the construction of the railroad, and the capital stock was increased to $37,500,000. In 1872 it was found that several members of Congress and the Vice President had been granted a number of shares of stock. This caused an investigation to be made by the House of Representatives. Oakes Ames, a wealthy Congressman from Massachusetts, Schuyler Colfax, Vice President of the United States, and several representatives were implicated in the charges. Resolutions of censure were passed by Congress against Ames and James Brooks of New York. The scandal died out shortly after and subsequent inquiries cleared the reputation of a number who were charged with bribery. The proposed railroad line was constructed and is in successful operation, being one of the highly important railroads in the United States.

CREE (krē), a tribe of the Algonquin Indians, one of the largest and most powerful branches of that family. It was chiefly confined to British America, inhabiting the country in the vicinity of Lake Winnipeg and the Saskatchewan River. The two main divisions are known as the Plains and the Wood Crees. Their language and customs were related to those of the Ojibwas. They are now confined to reservations and number about 10,000.

CREED (krēd), the statement or profession of fundamental points of belief of a religious body, or of the Christian Church at large. Many creeds sprang up at different periods in the development of Christianity, largely from the fact that Christ taught the simple truth in a concrete and informal manner; hence creeds may be said to have resulted from arguments and controversies as the teachings of Christ were drawn out into more precise and extended statements. The leading creeds include the following:

The Apostles' Creed, so named from the belief that the Apostles composed it, is accepted as a summary of the Christian faith by most churches. It is thought to date back to about

150 A. D., but it came down to us in its present form from the latter part of the 4th century.

The Nicene Creed was adopted by the Council of Nice in 325 and was promulgated to counteract Arianism. It is accepted as authority by the Roman and Greek churches and admitted by many of the Protestant denominations. It sets up the doctrine that Christ is of the *same substance* with the Father, and was supplemented in 381 by the Council of Constantinople, which emphasized the *divinity* of the Holy Ghost. This creed as modified by the Council of Constantinople is essentially identical with the form in which it appears in the Anglican prayer books.

The Athanasian Creed, which dates from the 6th century, was so named from Saint Athanasius, who supported the doctrine of the Holy Trinity and the *incarnation* of the Son of God. It is held as a creed of the Roman and Greek churches and is still read by the Protestant Episcopal Church of England, but is omitted from the services of the latter church in America.

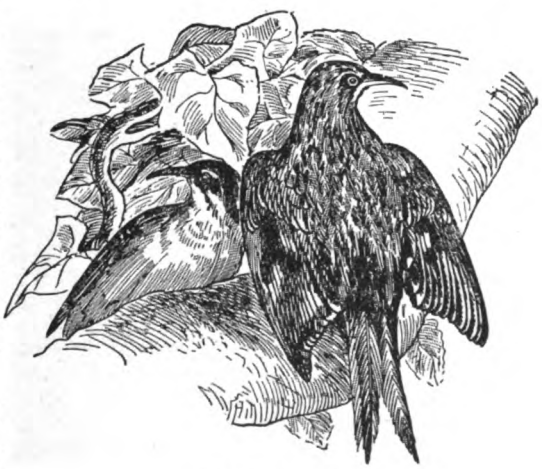
The Creed of Chalcedon, adopted by the Council of Chalcedon in the latter part of the 5th century, embraces the Nicene Creed and supplements it with the doctrine of the person of Christ. The Council of Trent formulated a statement of the doctrines of the Roman Catholic Church, and it was published as a bull by Pius IV. in 1864. This bull enforces the doctrines of *transubstantiation.*

The Augsburg Confession, adopted in 1530, embodies the fundamental doctrines of the Lutheran Church, which approves of the Apostles', Nicene, and Athanasian creeds. In addition it has the Catechisms of Luther, the Articles of Schmalcald, and a number of other confessions. The Church of England has the *Thirty-nine Articles,* and the Presbyterians support the *Westminster Confession of Faith,* one of the most elaborate of the creeds. The creeds named are the most important, and they constitute in a more or less modified form the basis of belief in the various churches. "Creeds of Christendom," published in three volumes, edited by Philip Schaff, is a reliable history of the confessions.

CREEK (krēk), an Indian tribe which was originally resident on the Coosa, Flint, Chattahoochee, and Alabama rivers and in the peninsula of Florida. The Creeks were first met by De Soto in 1540, and came completely under English influence after the overthrow of the French power in America. They joined the British in the Revolution and made an attack on Wayne's army in 1782. In 1790 they made a friendly treaty, but renewed hostilities two years later. Another treaty was made in 1796 and some land was ceded in 1805. They joined the English in the War of 1812, made an attack on Fort Mimms, Aug. 30, 1813, and massacred 400 people. After suffering numerous defeats they were completely overthrown by Gen. Jackson at Horseshoe Bend, March 27, 1814. A treaty followed in which some land was ceded, and early in the 19th century a portion of the tribe removed to Louisiana and later to Texas. In 1825 a treaty ceding some lands was agreed upon, but later it was repudiated.

Soon after the Creeks became divided into two factions, one favoring and one opposing emigration. A portion aided the Seminoles in 1836 against the government, and the remainder made an attack upon the frontier towns of Alabama and Georgia. Gen. Scott was sent against them, subduing them after numerous battles, and they were subsequently removed to a reservation between the Arkansas and Canadian rivers. In the Civil War a portion aided the Union and the others sided with the Confederates. A large tract of land was ceded by them to the government in 1866. This tribe of Indians held out against the teaching of the government for many years, but lately education has taken a firm foothold. Among the young people are many men and women who have taken readily to the common school and higher courses of study. They are skillful in the industries and are making rapid progress in the arts.

CREEPER (krēp'ĕr), a general name of any bird that seeks its food by running or creeping in the branches of trees. The common creeper of North America is quick and restless in its



TREE CREEPER.

movements, has a curved bill and rigid tail, and searches for insects and their eggs among the crevices in the bark. The upper part of the body is reddish-brown, the head is darker, and the rump is lighter. It is widely distributed and is often seen in company with the smaller woodpeckers and nuthatches. A species native to South America is known as the tree creeper, and is somewhat larger than the common creeper of North America.

CREMATION (krē-mā'shŭn), the act of burning a corpse instead of burying it. This process was practiced quite extensively among the Greeks and Romans. The Hindus long disposed of their dead to some extent by a ceremony called *mass*. Sir Henry Thompson, an eminent physician, advocated its introduction into England in 1873 on sanitary grounds, but made little progress, owing to public sentiment against the innovation. Lately it was introduced in many European countries and the annual cremations have increased steadily. In 1907 they reached 2,067. The first American crematory was established at Washington, Pa., in 1876, but there are now large crematories in New York, San Francisco, Boston, Chicago, Detroit, Saint Louis, Philadelphia, Buffalo, and many other cities. The number cremated in the United States in seven years, beginning in 1876, was twenty-five, but since then the custom has been making steady growth. In 1907 the number of cremations performed in that country was 2,682.

The retort of a crematory, in which the corpse is placed, is built of fire brick. Bodies to be cremated are placed over a fuel chamber in an inclosure heated through holes. The construction is of such a character that no flames reach the body, and the volatile matter passes through highly heated chambers and dissipates in the atmosphere. Coke and coal gas are used chiefly for fuel. The body is entirely cremated in from one to three hours, depending upon the size, during which time it is subjected to a temperature from about 2,000° to 2,500° Fahr. In some of the newer crematories the construction is somewhat different, the doors being packed air-tight with asbestos, in which the body may be wholly incinerated in about fifty minutes. Crematory societies have been organized in European and American cities, who make it an object to look after and care for the cremation of corpses. After incineration, the ashes are placed in urns in buildings expensively designed and decorated. These urns are carefully sealed, labeled, and placed in niches for future reference, or are incased within the monument in the cemetery.

CREMONA (krē-mō'nȧ), a city of Italy, in a province of the same name, 47 miles southeast of Milan. It is finely situated on the Po River and a number of railroads, and has a considerable trade in merchandise and manufactures. The streets are wide and well improved with paving and sewerage. Electric lights, waterworks, a public library, two theaters, and electric railways are among the public utilities. It is the seat of a bishop and has several fine churches and palaces. Among the manufactures are porcelain, earthenware, mustard, cotton and silk textiles, and machinery. The Amati family, manufacturers of violins, resided at Cremona. It was colonized by the Romans in 218 B. C., was destroyed by Vespasian in 70 A. D., and was afterward captured by the Lombards. Population, 1906, 40,510.

CREOLE (krē'ōl), the name given to the descendants of French and Spaniards born in America and the West Indies. The application of the term has recently been widened to include all descendants of Europeans born in tropical America and the West India Islands. The Creole dialect is a mixture of different languages, including the native languages and Spanish, French, and English. Creoles are not a strong, robust race of people.

CREOSOTE (krē'ō-sōt), an oily, colorless liquid obtained chiefly from wood tar and coal tar. It was first made in 1832 by Reichenbach who obtained it by the destructive distillation of wood. Creosote has a specific gravity of 1.037 at 68°, evaporates without residue, has a burning taste, and mixes readily with ether, alcohol, and chloroform. It is used in the preservation of meats, in the treatment of tuberculosis, and for various purposes in medicine and surgery.

CRESCENT (krĕs'sẹnt), the name applied to the moon in its first quarter, when its disk is enlarging and its horns are acute. A representation of the half-moon with upturned horns, called a crescent, was used by the ancients, especially the Egyptians and Greeks, as a symbol for their moon goddesses. The Byzantine Empire adopted the crescent as an emblem. After the capture of Constantinople by the Turks in 1543, it became the permanent emblem of the Turks and the Turkish Empire. Many of the churches in Russia have a crescent on the dome, surmounted with the cross, signifying that the Russian Church has a Byzantine origin.

CRESS (krĕs), the name of several species of plants with acrid or pungent leaves, most of which belong to the mustard family. They are widely distributed in the temperate and northern parts of the earth. The water cresses are the most common species. They grow abundantly on the brinks of small streams and ponds and are eaten as a salad. The *Virginia cress* is cultivated as a salad in Great Britain and many parts of North America. It is easily cultivated and thrives best in a damp or moist soil.

CRESTON (krĕs'tŭn), a city in Iowa, county seat of Union County, about 70 miles southwest of Des Moines, on the Chicago, Burlington and Quincy Railroad. It is surrounded by a farming country and has extensive railroad shops. The chief buildings include the courthouse, the high school, and a number of fine churches. It has manufactures of cigars, vehicles, and machinery. The public utilities include sewerage and waterworks systems. It was settled in 1868 and incorporated in 1869. Population, 1905, 8,382; in 1910, 6,924.

CRESWICK, Thomas, landscape painter, born at Sheffield, England, Feb. 5, 1811; died

Dec. 28, 1869. He studied at Birmingham and London, and in 1842 was awarded a premium by the British Institution. His pictures are mostly of large size, show a precision in drawing, and portray fine sky and landscape effects. He acquired some reputation as an etcher. Among his chief paintings are "Weald of Kent," "Welsh Glen," and "London Road a Hundred Years Ago."

CRETACEOUS PERIOD (krē-tā'shŭs), the division of geologic time which immediately follows the Jurassic and precedes the Eocene. It is so named from the chalk beds of England and France, where the term was first used, but the Cretaceous system is constituted only in part of chalk formations. Cretaceous rocks are found abundantly in North America. They extend from the mouth of the Mackenzie River southward into Mexico, occupy a great part of the Atlantic coastal plain from New York to Florida, whence they stretch westward to Texas and points near the Pacific Ocean, and are found in a large scope of the country from the mouth of the Ohio River to the Gulf of Mexico. Deposits of coal occur in the Cretaceous system west of the one hundredth meridian, which coal area embraces many sections of the Rocky Mountains. In some places they contain much greensand or marl, which is used extensively for fertilizing land in New Jersey and elsewhere. The thickness of the deposits vary materially, being about 400 feet in New Jersey, 2,000 feet in the Missouri basin, and 12,000 feet in many sections of the Rocky Mountains. This system is rich in both plant and animal fossils. The plants include palms, maple, willow, poplar, oak, and birch. Among the fossil animals are the crocodile, sponges, fish, sea serpents, birds with teeth, dinosaurs, and sea saurians.

CRETE (krēt), or **Candia,** one of the largest islands in the Mediterranean Sea, located south of the Aegean Sea and the Archipelago. It is about 150 miles long, from six to thirty-five miles wide, and has an area of 3,500 square miles. The surface is mountainous, including several well-defined ranges, of which Mount Ida is the culminating peak, 8,050 feet above the level of the sea. The mountain ranges extend the entire length of the island. They are covered with forests and penetrated by a number of fertile valleys. Much of the coast plain is exceedingly fertile. The southern coast has few harbors, but the northern coast is indented by several inlets, including the Bay of Suda. Many of the valleys are irrigated by numerous springs, and are covered by a luxuriant vegetation. Crete has a mild climate, cool in summer on account of northern winds, and distinguished in winter by numerous showers of rain. The industries are not in a high state of development at the present time. It has valuable deposits of iron, building stone, cobalt, manganese, and granite. Agriculture is the principal occupation, yielding cereals, cotton, and fruits, while the silk industry is securing a strong foothold. The fisheries yield valuable products; the vineyards produce largely, and from the forests cork and essential oils are obtained. Among the domestic animals are horses, cattle, poultry, and sheep. However, the manufactures and transportation are insignificant. Fabrics, machinery, utensils, and spirituous beverages are the principal products of manufacture. Most of the harbors of former ages are silted up and in poor condition.

The history of Crete has its beginning in the period of Grecian mythology. Saturn, Minos, and Zeus are spoken of in Grecian fables among its kings. It was once a republic, then became the seat of Silician pirates, and was conquered by the Romans in 67 B. C. The apostle Paul visited Crete and established a church in it. In 823 A. D. it passed to the Saracens, but was returned to the Greeks in 962 by virtue of the conquest of Nicephorus Phocas II. It was given by the Byzantines to Boniface of Montferrat, who sold it to the Venetians in 1204, under whose dominion it remained until the latter part of the 17th century, when it fell to the Turks after a struggle of nearly twenty years. An insurrection occurred in 1868 against Turkish rule, but it was suppressed after a desperate struggle. Another insurrection broke out in 1877, which was followed by a declaration of union in 1878 with Greece. Peace was finally concluded by a concession of partial self-government under Mukhtar Pasha. Religious differences between the Cretans, whose religion is Greek Catholic, and the Mohammedans, led to difficulties which culminated in new troubles in 1884 and terminated in a war in 1897, in which the Cretans had the support of Greece. A number of European powers interceded and effected a blockade of the island with their fleets, but war was prosecuted between Turkey and Greece on the continent. While the conflict terminated in the success of Turkish arms, the interests of Crete were protected by the powers.

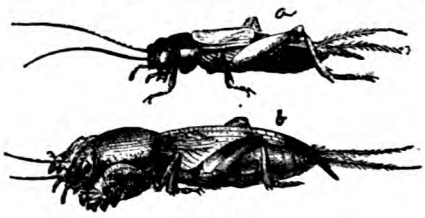
On Nov. 26, 1898, Prince George of Greece was announced as high commissioner of Crete by a number of European powers, who had agreed upon his nomination. He assumed the duties of his office in December of the same year. The arrangements acknowledged the suzerainty of the Sultan, guaranteed freedom of religion and security of life and property, and established a native army. As a result of the war of 1913, Crete was annexed to Greece. The language spoken is Greek. During its greatest prosperity Crete had a population of 1,200,000 and at the time of the Venetian dominion, about 900,000. Canea, the capital and largest city, has a population of 24,856. Candia is important as a port. In 1916 the island had a population of 312,514, of which 33,395 were Moslems and the remainder were mostly Greek Christians.

CRIBBAGE (krĭb'bāj), a game at cards

played by two, three, or four persons with a full pack of 52 cards. A game called five-card cribbage, played by two persons, is the most popular amusement of this class. In playing the cards have a value as marked, except that the ace counts one and the face cards each ten. The points are scored by *pegs* on a board perforated with the necessary number of holes, called the *cribbage board,* and sixty-one points constitute the game. The advantage lies with the dealer, who makes up a third hand for himself, called the *crib,* partly out of the hand of his opponent, who at the commencement of the game is entitled to score three points for having lost the deal, which is determined by the players cutting for deal. The rules depend somewhat upon the game played. Three-handed cribbage is played by three persons on a triangular board, and in four-handed cribbage two persons play in partnership against the others.

CRICHTON (krī'tŭn), **James,** surnamed the Admirable, born at Eliock, Scotland, Aug. 19, 1560; slain in 1582. He descended from the Scottish kings, was educated at Saint Andrew's University, and early became accomplished in ten different languages and in science and literature. He traveled in France, Germany, and Italy and attracted universal amazement and applause. His popularity was enhanced by his beauty of person and elegance of manners. He became tutor of the son of the Duke of Mantua, and when in that district killed a skilled duelist. While on the streets one night he was attacked by a half dozen people in masks on account of jealously of his skill with the sword and his scholarly accomplishments. They were soon put to a disadvantage by his swordsmanship. When the leader became known, he was found to be one of Crichton's pupils. On asking his pardon and handing him his sword, the pupil received the sword and thrust it through the body of his teacher. It is thought that the biographers have greatly exaggerated the virtues and learning of Crichton.

CRICKET (krĭk'ĕt), a genus of insects which resemble certain kinds of locusts and include numerous species, among them the house, mole, field, and wingless crickets. The wings are straight, and, when not in use, are folded in a longitudinal position along the back. The jaws move transversely, like those of beetles, while the head is thick and the feelers are long, and they possess remarkable power of leaping and making a rasping sound. However, the organs of sound are possessed only by the males, and they are used to attract or excite the females. A large class of these insects, known as *field crickets,* are seen in vast numbers about harvest time. The *house cricket* is about one inch long, has a yellowish-brown color, and the feelers are about as long as the body. It has been associated with the fireplace of the home, largely on account of the noise made by the wing covers of the male, and feeds on crumbs, finding safety in cracks and crevices of the walls. In the daytime it remains secluded, but comes out at night in search of food, when its familiar noise is heard. The *mole cricket*



CRICKET.
A, house cricket; *B,* mole cricket.

has large fore legs developed for burrowing. Crickets are widely distributed in America and the other grand divisions. The *Sicilian cricket,* native to Sicily, issues the loudest noise.

CRICKET, a popular athletic game, the national game of Great Britain. It is played on a smooth greensward with bats, balls, and wickets. The players form two sides of eleven each. A ball, two bats, and two sets of wickets and bails are required to play the game. The *wickets* consist of thick wooden stumps, twenty-seven inches high, and are placed on the ground in sets of three, at a distance of twenty-two yards apart. On the top of each set of stumps are placed two small pieces of wood, called *bails.* The rival sides toss for first innings, and the director of the side that is to play first places two of his men at the wicket as *batters,* while a *bowler,* a *wicket-keeper,* a *long-stop,* and *fielders* are placed in their several positions by the director of the opposite side. After these arrangements have been made and the *markers* or *scorers* are at their post, the *umpires* take their places and the game begins. The relative merits of the rival sides are decided by the total number of runs made by each eleven batters during two innings, the side whose players score the most being the winner. The bowler's object is to direct his ball by a swift movement of the arm toward the opposite wickets, at which one of the batsmen stands, and, if possible, to strike down the stumps or knock off the bails; while the object of the batsman, on the other hand, is to protect his wickets from the bowler's attack, by either stopping the ball when it reaches him or driving it out to the field.

CRIME, a grave offense against social order, morality, and law. The term cannot be defined in the same way in all ages and all countries, for the reason that the social and legal requirements differ widely. It has been made the object of statistical investigation for many years. Some writers regard crime as a disease, while others think that the environments and hereditary tendencies are largely instrumental in placing individuals in the list of criminals. The bureau of education in the United States made an investigation of the subject a few years ago

and reported that eighty-two per cent. of the criminals examined were in good health, while eleven per cent. were in fair health at the time of committing the offense. Lord Brougham stated in 1860 that "criminal statistics are to the legislator what the charts and the compass are to the navigator." The object of study has been largely to ascertain the effects of criminal legislation, and to learn the real nature of crime, its extent, increase or decrease, and the influences that determine it.

The different conditions existing in various countries, together with the environments of the individuals, such as religious tendencies, climatic influences, form of government, scarcity of food and clothing, and social surroundings, have a marked influence on all material factors that enter into the production of the criminal type. On examining 82,329 prisoners it was found that two per cent. of the offenses were against the government; twenty-three, against society; twenty-one, against the person; forty-six, against property; and eight, of a miscellaneous character. Of the offenses committed in the United States it was found in a recent examination that fifty-six per cent. were committed by persons of foreign birth, and that climatic and geographical conditions influence in various respects. Those engaged as laborers seem to show a greater disposition to commit crime against the person of others than against property, while the reverse is true of those engaged in trades and commerce. Males show a greater tendency to crime than females, which is partly accounted for by the fact that upon the former devolve more largely the means of getting a livelihood. However, the statistical reports on the relative tendency to crime in the sexes must be taken with some allowance, because in females crimes are often condoned. Education shows a marked tendency toward overcoming crime, since the illiterate commit more numerously the higher crimes. An investigation made in Germany in 1905 demonstrates that married men respect property more generally than single men. They do not often commit the crimes against property, such as fraud and robbery, and are less prone to commit offenses against morality and human life. The same investigation demonstrated that widowers commit more crimes between the ages of thirty and fifty than either the married or unmarried men, but their tendency to crime decreases with their advancing years.

Poverty, ignorance, and idleness are the three most prolific sources of crime. Individuals rarely steal when they have an intelligent conception of life, remunerative employment, and a natural bent to industry. The best reforms then would seem to lie in wholesome economical legislation, universal education, and such restrictions that each offender may receive approximately exact justice. Recent writers quite generally agree that punishments should not have retribution for their object, but the penalty should be calculated as to its efficacy in removing from society the cause of danger. A thorough system of right education induces habits of industry in the young, while remunerative employment is a preventive against falling into the necessity of violating law in order to subsist. The education must go beyond the schoolroom; it must be furthered by libraries, public policy, and the sum of effective external circumstances which influence the character of society.

CRIMEA (krī-mē'ȧ), a peninsula in the southern portion of Russia, between the Sea of Azov and the Black Sea, and attached to the mainland by the Isthmus of Perekop. It is about 200 miles from east to west and has an area of 10,000 square miles. For governmental purposes it belongs to the Russian province of Taurida. The southern coast is elevated, while the remaining parts belong to the regions of the steppes. It is watered by numerous small streams, of which the Salghir and Alma rivers are the most noted. The climate is pleasant in summer, but quite severe and changeable in the winter season. Among the products are flax, hemp, tobacco, cereals, and many varieties of fruits. In the mountain districts are limited areas of excellent forests, which yield good building material. The domestic animals consist of horses, cattle, swine, and fine-wooled sheep.

The chief city and part of the Crimea is Sebastopol, from which a railroad line extends through the central portion and connects with all parts of western and northern Russia. Owing to its location on the boundary between Europe and Asia, it has been the seat of many military contentions. It belonged to the Cimmerians in early history, passed over to the Greeks, and later became a part of Rome. After the decline of Rome, it was occupied by barbarian tribes, and in 1237 it was overrun by the Mongols under Genghis Kahn. The Genoese captured and fortified Kaffa in 1261. They occupied large portions of it until 1475, when they were expelled by Mahomet II., who made it a dependent khanate. The Russians took possession of it in 1783, and it has been under their dominion with more or less restriction since that time.

The Crimean War occurred between Russia and the allied forces of France, Turkey, and England in 1854-56. The war was caused by Russia's attempt to secure preponderance in the eastern part of Europe by crowding the Turks out of the Continent, occupying Constantinople, and making Servia, Bosnia, and Bulgaria principalities of the Russian Danube territory. Russia took this step with the avowed purpose of securing a protectorate over the Greek Church, which brought the issues to a crisis. In the war which followed were fought the battles of Alma, Tchernaya, Balaklava, and Inkerman. The contest terminated by the loss to the Russians of their strongest fortress, Sebastopol. The last-named fortress had been greatly strengthened

by Catharine II. in 1786 with the view of overawing the Turks. After its fall, a treaty of peace was concluded at Paris, April 27, 1856, by the terms of which the Ottoman Empire was guaranteed independence. The Crimea has a population of 583,962, about half of which is Russian. The others include principally Tartars, Greeks, Jews, Germans, and Bulgarians.

CRIMEAN WAR. See **Crimea.**

CRINOIDEA (krĭ-noid'ē-ȧ), the name of a group of sea animals, so called from the fact that their body resembles the form of a water lily. They consist of an expanded or spreading disk upon the end of a long, slender, jointed stem, which is attached to the bottom of the sea during practically the entire period of their life. At present the species are limited to a small number, but formerly, especially during the Carboniferous Age, they were very numerous, which is evident by the large number of fossil remains found in the deposits of that period. The first traces of their remains are found in the Silurian system, and most of the species appear to have become extinct with the formation of the more recent carboniferous rock. The animals of this class now living feed on spores of algae, minute crustaceans, and other food forms common to the sea. They are very sensitive to a change of temperature, inhabit the deeper water, and when disturbed fall on the bottom of the sea or swim away by movements of the arms. Their arms drop off when the animal is placed in an uncomfortable position, but are restored through a process of regeneration, if the main body survives.

CRINOLINE (krĭn'ō-lĭn), a stiff fabric formerly made of horsehair, but now of various material, used for stiffening a collar, skirt, or other parts of a garment. The same name is applied to a hoopskirt, which has been fashionable at various periods. The hoopskirts worn in 1740 were three feet across the hips.

CRIPPLE CREEK, county seat of Teller County, Colorado, about ninety-five miles southwest of Denver, on the Midland Terminal, the Florence and Cripple Creek, and other railroads. It has a healthful climate and is surrounded by a picturesque country. The chief buildings include the high school, the courthouse, the public library, and several fine churches. It has extensive systems of street lighting and public waterworks. The industries consist chiefly of machine shops and enterprises connected with mining. Cripple Creek is among the most interesting and remarkable of the newer mining towns of the West. Gold was discovered in its vicinity in 1886, but the more productive veins were not found until 1891, when Robert Womack and others opened up a very productive lode. It was soon after developed by the Gold King Mining Company, and within a very short time the town had a population of 9,000. The output in 1891 was $20,000, but this was enlarged annually until the normal output reached about $18,000,000. A fire did considerable damage in 1896, but it was soon rebuilt and improved. In the vicinity are a number of other mining towns, including Altman, Anaconda, Lawrence, and Victor. Population, 1910, 6,206.

CRISP, Charles Frederick, American statesman, born in Sheffield, England, Jan. 20, 1845; died in Atlanta, Ga., Oct. 23, 1896. His parents were visiting in England at the time of his birth and returned to the United States in 1846. They settled in Georgia, where the young man received a common school education. He entered the Confederate army in 1861 and was promoted to the rank of lieutenant, and taken prisoner by the Union forces in May, 1861. After the war he studied law and was admitted to the bar. He was elected attorney-general of the southwestern judicial district of Georgia in 1872 and served till 1877, when he became judge of the superior court. He was soon after elected to the same office by the General Assembly, and was reëlected in 1880 for a term of four years. In 1882 he was elected to Congress, of which he was a member until his death, serving as speaker of the House from 1892 until 1896.

CRISPI (krĕs'pē), **Francesco,** Italian statesman, born in Sicily, Oct. 4, 1819; died Aug. 11, 1901. After studying law at Palermo, he was admitted to the bar, becoming noted as an advocate. He took a prominent part in the Palermo insurrection in 1848, and, after it failed, went into exile. However, he organized another revolution in 1859-60, landed at Palermo with Garibaldi, and was successful in the expulsion of the Bourbons and the annexation of Sicily to Italy. He became a prominent member of the provisional government, was elected to the first parliament of united Italy in 1861, and in 1876 became president of the chamber of deputies. After serving for several years as premier in Italy, he resigned in 1891 and resumed the office in 1894, but, after a downfall of the ministry on account of a defeat of the Italian forces in Africa, he was succeeded by Marquis di Rudini in 1896. In 1898 Signor Crispi was charged with having extorted large sums of money from the banks of Rome and Naples. Parliament appointed a committee to investigate the matter. The committee voted that there was no ground for impeachment, but censured him for the offense. As soon as the report was read, he resigned and appealed to his constituents for a vindication. This resulted in his reëlection to the parliament in April by a large majority. The name of Crispi is indelibly connected with the progress of modern Italy.

CRITIC (krĭt'ĭk), one who possesses literary qualifications to judge of the qualities of anything by some standard, criterion, or canon. The term is applied particularly to one who reviews and judges productions of literature and art.

CRITICISM (krĭt'ĭ-sĭz'm), **Higher,** the term applied to the criticism of the origin, form, and value of the Bible and other books, in distinction

from the *lower criticism*, which is concerned with their text. A few attempts at this criticism were made in the early centuries of the Christian era, but extensive work along this line is wholly modern. The first work of any extent was published by Jean Astruc in a book entitled "Conjectures Concerning the Original Memoirs used by Moses in Composing the Book of Genesis," which appeared in print at Brussels in 1753. The literature on this subject is now almost without limit. The most complete discussion is contained in the "Higher Criticism," by A. C. Zenas, New York.

CRITTENDEN (krĭt't'n-dĕn), **George Bibb,** soldier, born at Russelville, Ky., Mar. 20, 1814; died Nov. 27, 1880. He graduated at West Point in 1832, opened a law office in Kentucky, and subsequently served in the Mexican War. In 1856 he was promoted to be lieutenant colonel, but resigned in 1861 to join the Confederate army, in which he had command of Kentucky and part of Tennessee. He was made major general and was successful as a commander, but was censured for his conduct at the Battle of Mill Spring, where he was defeated. Afterward he served in the army as a volunteer and was State librarian of Kentucky in 1867-71.

CRITTENDEN, John Jordan, statesman, born in Woodford County, Kentucky, Sept. 10, 1787; died near Frankfort, July 26, 1863. He graduated from William and Mary College, Virginia, in 1807, was admitted to the bar, and became celebrated as a successful criminal lawyer. He was appointed attorney-general of the Territory of Illinois in 1809, elected to the Legislature of Kentucky in 1811, and to the United States Senate in 1817. In 1827 he became attorney-general of Kentucky, was made secretary of the state in 1834, and again entered the United States Senate in 1835, where he supported Henry Clay's measures. He was appointed Attorney-General in the Cabinet of President Harrison and served through his administration and that of Fillmore. When Henry Clay resigned in 1842, he was appointed in his place and was elected for a full term the year following. The annexation of Texas was opposed by him, but the war with Mexico received his support. He became Governor of Kentucky in 1848, and was again elected to the United States Senate in 1855, where he opposed the proslavery policy of Pierce and Buchanan. In 1861 he was succeeded in the Senate by John C. Breckenridge, but was elected to the House of Representatives the same year. He was a strong supporter of the Union, but opposed the employment of negroes as soldiers and the formation of West Virginia as a separate State. All of the great events prior to and during the early part of the war received marked attention from him, and he was in the midst of a political campaign for reëlection to Congress when his death occurred.

CRITTENDEN, Thomas Leonidas, soldier, born in Russellville, Ky., May 15, 1815; died Oct. 23, 1893. He was the son of John Jordan Crittenden, was State attorney in Kentucky in 1843, and rendered honorable service during the Mexican War. In 1862 he commanded a division of the Union army at Shiloh, took part in the battles of Murfreesboro and Chickamauga, and commanded a corps at the Battle of Stone River in 1863, where his gallant conduct won promotion to the rank of brigadier general. In 1866 he entered the regular army, serving until 1881, when he retired.

CRITTENDEN COMPROMISE, a measure introduced by John Jordan Crittenden, in 1860, in the United States Senate. The proposition was in the form of a constitutional amendment which would permanently divide the Union into a free state and a slave state, the boundary being the line of 36° 30′. It provided that the United States was to pay the owner for any fugitive slaves, that the Federal government could not limit or prohibit the interstate slave trade, and that slavery was to be retained in the slave states and in the District of Columbia. The proposition caused much discussion in both branches of Congress and throughout the country. On Jan. 14, 1861, it was defeated in the House by a vote of 113 to 80, and on Mar. 2, 1861, in the Senate by a vote of 20 to 19.

CROATIA AND SLAVONIA (krō-ā'shĭ-ȧ, slȧ-vō'nĭ-ȧ), a province of Austria-Hungary, constituting one of the crown lands of Hungary. It is bounded on the north by Styria and Carniola, on the east and northeast by Hungary, on the south by Servia, Bosnia, and Dalmatia, and on the west and southwest by Istria and the Adriatic Sea. Croatia occupies the southwestern and Slavonia the northeastern part. The Drave river separates it from Hungary, and through the central part flows the Save river, which separates Croatia from Slavonia. The area is 16,675 square miles.

Most of the surface is mountainous, being cut up by ranges of the Julian and Styrian Alps, which attain heights of from 2,000 to 4,000 feet. Croatia contains the Agram Highlands, the Kapella, and the Croatian Karst. A fertile coast plain and productive valleys characterize the surface of Slavonia. Currents of the Adriatic sweep across the coast land of Croatia, hence its climate is raw and changeable, and numerous swamps make the climate of Slavonia somewhat unhealthful. The minerals consist chiefly of coal, copper, sulphur, and marble. Glass, paper, sugar, silk and cotton textiles, spirituous liquors, and machinery are the principal manufactures. About thirty-five per cent. of the surface is arable land and a considerable portion is utilized for meadows and in forestry. Corn and wheat are the chief cereals and cattle and hogs are grown in large numbers. Fruit, especially grapes, and vegetables, are important products. Transportation is furnished by the Drave and Save rivers and a number of railroads. Fiume, on the Adriatic, is a port of entry and has rail-

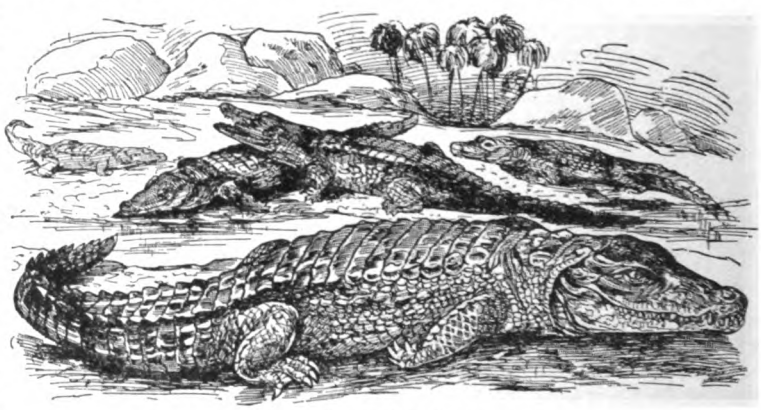
road connection with the principal cities of the country. Porto Ré, Zengg, and Agram are commercial centers.

Both Croatia and Slavonia were a part of ancient Pannonia, a province of Rome. They comprised border territory in the conflict between Christianity and Mohammedanism for many centuries. Croatia was annexed to Hungary in the eleventh century, but it has continued a policy looking toward greater independence. The *Ausgleich* of 1867 was partially applied to both Croatia and Slavonia, and its ban, the chief executive, is appointed by the Emperor of Austria in the capacity of King of Hungary. The inhabitants consist largely of Serbs and Croats, with a small mixture of Germans and Hungarians. A large majority of the people belong to the Roman Catholic church, but the Greek Orthodox and a number of Protestant denominations are well represented. Population, 1916, 2,425,512.

CROCKETT (krŏk'et), **David,** pioneer, born in Limestone, Tenn., Aug. 17, 1786. At the age of twelve years he became an associate of a German and tramped with him 400 miles. Being dissatisfied, he returned home and worked as a teamster and drover for several years. He learned to read and write at the age of eighteen years, when he attended school for a few weeks. In 1811 he removed to Franklin County, then a wild and unsettled part of the State, and two years later served in the war against the Creek Indians under Gen. Jackson. He was elected to the Legislature in 1821, where he made a creditable record, although he was ignorant of the art of public speaking. He was reëlected to the Legislature and in 1826 secured a seat in Congress, where he served three terms. His reputation at Washington was that of a man of shrewdness, common sense, and thorough independence. When the Texan contest for independence broke out, he joined the Texan patriots. He was one of the 140 defenders of Fort Alamo, who were attacked by a large Mexican force. All but six men were killed in the defense, and along with five survivors he surrendered to Santa Anna. The survivors were shot by the orders of the commanding general on March 6, 1836.

CROCKETT, Samuel Rutherford, novelist, born in Galloway, Scotland, Sept. 24, 1860. He was the son of a tenant farmer. His ability in the common schools attracted the attention of his teacher and caused his admission to the University of Edinburgh in 1876, where he graduated four years later. He became traveling tutor of Oxford University, in which capacity he visited all important parts of Eurasia and Africa. During convenient times he wrote for periodicals and engaged in novel and poem writing. His versatility, close discernment, and agreeable style made his works highly popular. After returning to Scotland, he completed a course at the Free Church New College, and received a charge at Penicuik, in the Free Church. Among his writings are "The Sticket Minister," "Mad Sir Uchtred," "Bog, Myrtle, and Peat," "Lilac Sunbonnet," "Poems of Ford Beriton," "Men of the Moss Hags," and "The Banner of Blue." He died April 20, 1914.

CROCODILE (krŏk'ō-dīl), a large reptile which resembles a great lizard, found in portions of Africa, Asia, the Sunda Islands, and the Moluccas. Crocodiles are one of four living representatives of the order *Crocodilia.* The other three are lizards, serpents, and the class



AFRICAN CROCODILE.

including turtles and tortoises. The group of crocodiles includes the crocodiles, alligators, and gavials. The alligators are native only to America, while the gavials belong exclusively to Asia and are found principally in India. All the animals constituting the *Crocodilia* are oviparous; that is, they produce eggs and hatch their young outside the body. They are characterized by long jaws and four short limbs; the fore feet have five toes and the hind feet four, the latter being webbed. Square bony plates cover the skin; the tail is long and compressed laterally. The tear glands are large, the heart is four-chambered, and the nostrils are located at the end of the snout, with capacity to close against ingress of water.

Crocodiles live mostly in water, but they are seen frequently on the sand in the warm sun. Their movement in the water is quick and well directed, while on land they move forward rapidly, but are slow to turn their bodies. The best way to elude them on land is to turn rapidly and repeatedly in making a retreat from

them. Their food consists of flesh, such as fish, quadrupeds, and carrion, and is preferred in a state of putrefaction. The eggs, about the size of goose eggs, are laid in the banks under covering and hatched by the warmth of the sun. The female of some species guards the eggs and shows marks of tenderness to the offspring. Crocodiles sometimes attain a length of thirty feet and attain a great age. The older individuals do not hesitate to attack larger animals and man. They are accompanied by a little bird, much like the cowbird associated with cattle. This bird consumes the insects and worms that fix themselves to their bodies and warns them in times of danger. They were held sacred by the ancient Egyptians. At present they are not found on the Nile, except near its head waters.

CROCUS (krō'kŭs), a genus of plants native to the eastern part of Europe and to Asia Minor. Several of the species bloom profusely. The flowers are violet, purple, yellow, white, striped, or saffron-colored. They are extensively cultivated in gardens; a sandy soil is best for prolific growth. According to their period of flowering, they are divided into the *vernal* and the *autumnal* crocuses. The dried stigma and style of several species form a powerful aromatic and are used to color an orange-yellow.

CROESUS (krē'sŭs), the last King of Lydia, the son and successor of Alyattes. He became king when he was thirty-five years old, about the year 568 B. C. He extended the kingdom eastward to the Halys River, making the Greeks of Asia Minor tributary. Great wealth passed to him from his father. To this he added largely by conquest and by the riches of the golden sands of the Pactolos River, until his treasures became proverbial. The Greeks looked upon him as a perfect type of human prosperity, greatly in contrast with his downfall. The Grecian historian, Herodotus, makes the history of his life a vivid, dramatic story. He relates that Solon visited Croesus, and, after being shown his great riches, was asked whom he regarded the happiest man. The sage answered: "Tellus, of Athens, because he lived in the time of his country's prosperity, was surrounded with children and children's children, who were both beautiful and good; and met death upon the battlefield after gaining a celebrated victory over his enemy." Next to him, Solon counted Cleobis and Bito, two Grecian youths who had won prizes at games by reason of their strength and skill, and afterward drew the car of their mother forty-five furlongs to the festival of Juno, on account of which the praises of all men were given to them, and they were allowed to die in the temple of the goddess, after offering sacrifices at the holy banquet in her honor.

Later in life the misfortunes of Croesus began to multiply. His favorite son was accidentally slain at a boar hunt, while his army was conquered by Cyrus. It was prophesied by the oracle of Delphi that he would destroy a mighty empire, if he went to war. It was later demonstrated that the empire to be destroyed was his own, for Cyrus defeated his army and conquered Sardis. At the fall of Sardis he was about to be slain, when his son, who had been dumb, suddenly regained his speech and made known to the Persians that his father was the king. He was therefore taken before Cyrus as a prisoner and condemned to die on the funeral pyre. As he saw the flames rising, the words of Solon came to his mind, and he spoke his name so it was heard by those next to him. When Cyrus heard of this, he requested Croesus to explain why he had spoken of Solon, and the captive replied that the sage visited him in his prosperity and stated that no man should be counted happy until the manner of his death was known. Cyrus became deeply impressed and released the captive, making him the guardian of Cambyses, the heir to his throne, and his own confidential friend.

CROKER (krō'kĕr), **John Wilson,** author and statesman, born in Galway, Ireland, Dec. 20, 1780; died Aug. 10, 1857. He was educated at Trinity College, Dublin, studied law and was called to the bar, and in 1804 published "Familiar Epistles," a satire on the Irish stage. He was one of the founders of the *Quarterly Review,* to which he contributed a large number of articles. In 1808 he was elected a member of Parliament, where he defended the duke of York against a charge of corruption in office, and was a strenuous opponent of the reform bill. His writings include "Battle of Talavera" and "History of England for Children."

CROKER, Richard, politician, born at Black Rock, Ireland, Nov. 24, 1843. He came to the United States with his parents at the age of two years and received an education in the schools of New York City. He was elected alderman in New York in 1868 and in 1872, coroner in 1873, fire commissioner in 1883, and city chamberlain in 1889. While in these city positions he became a leader of the Tammany Hall organization in New York City. In 1899 he attracted attention at a banquet given in memory of Thomas Jefferson by outlining the policy of the Democratic club. Being opposed to bimetallism, he supported McKinley in 1896, but gave Bryan hearty support in 1900, owing to his opposition to the foreign policy pursued by the administration of President McKinley. In 1902 he resigned as leader of Tammany Hall and for some years resided in Ireland.

CROLY (krō'lĭ), **Jane Cunningham,** author and journalist, born at Market Harborough, England, Dec. 19, 1831; died Dec. 23, 1901. She came to the United States in 1839, and after attending school began to contribute to magazines and newspapers. She married David Croly, a journalist, in 1856, in which year she called the first congress of women in the United States. In 1889 she founded the New York City Women's Press Club, and three years later was

made professor of journalism and literature at Rutgers Women's College, which institution conferred a degree upon her. In literature she is known quite extensively as "Jenny June." Her publications include "Thrown on Her Own Resources," "Knitting and Crocheting," "For Better or For Worse," "Cookery Book for Young Housekeepers," and "History of the Woman's Club-Movement in America." In 1860-87 she edited *Demorest's Magazine.*

CROME, John, landscape painter, born at Norwich, England, Dec. 22, 1768; died April 22, 1821. His subjects were taken largely from the scenery of his native country, but he was influenced greatly by the Dutch school of painters. He executed a large number of etchings which are valued for their faithful representation of trees. His reputation did not rise until after his death, when his pictures began to sell at a high price. He is regarded the founder of the Norwich school of artists. His paintings include "Fish Market at Boulogne," "Oak at Poringlam," "Chapel Fields, Norwich," "Household Heath," and "Boulevard des Italiens, Paris."

CROMER (krō'mēr), **Evelyn Baring,** diplomatist, born at Norfolk, England, Feb. 26, 1841. He was educated at the Royal Military Academy at Woolwich, served as Governor General of India from 1872 to 1876, and was for some time commissioner of finances in Egypt. In 1880 he was made Finance Minister of India and three years later became counsel general and minister plenipotentiary in Egypt. In 1892 he was made first Baron Cromer and in 1901 was created an earl. His splendid public service in Egypt rescued that country from bankruptcy and promoted the efficiency of public service. He published a number of state papers and military works. He died Jan. 29, 1917.

CROMPTON (krŏmp'tŭn), **Samuel,** inventor of the mule-jenny, born at Firwood, Lancashire, England, Dec. 3, 1753; died June 26, 1827. He displayed an early disposition for mechanics and educated himself, working a portion of the time as a cotton spinner. On account of musical skill, he earned small sums of money by playing the violin at Bolton Theater. He invented his machine for spinning cotton at the age of twenty-one years, but was financially unable to have it patented, or to engage in the manufacture of fabrics. At length he made his invention known to a few manufacturers for small sums of money, receiving in all about $300. Later he secured a loan of $2,500 from a friend whereby he was enabled to employ a few hands besides his own family, and was fully sixty years of age before any profit came to him. Parliament later voted him an allowance of $25,000. His invention was made after Hargreaves' spinning jenny and Arkwright's roller frame had been invented, and his mule, as it is commonly called, combines the principles of both. His success in making the invention has caused him to rank as one of the greatest benefactors to mankind. In 1811 fully 155,880 of Hargreaves' spindles, 310,500 of Arkwright's, and 4,600,000 of Crompton's were in use. It is estimated that at the present time there are fully 30,000,000 spindles in use in which Crompton's principles are employed.

CROMWELL (krŏm'wĕl), **Oliver,** Lord Protector of the British Commonwealth, born at Huntingdon, England, April 25, 1599; died Sept. 3, 1658. His elementary education was secured at Huntingdon and in 1616 he was admitted to Cambridge, but left the university on the death of his father, after attending about one year. He married Elizabeth, daughter of Sir James Bourchier, a woman of prudent character and amiable disposition. In 1628 he entered the House of Commons for Huntingdon, during the critical period when Parliament and Charles I. were at variance. He was among the first to proffer aid to the state in the long contention which followed and raised companies of volunteers, drilling them at his own expense. The companies drilled by him were known as *Cromwell's Ironsides,* and with them he rendered astonishing military service for the parliamentary army at Naseby in June, 1645, when the forces of the king were utterly routed. In May, 1546, the king escaped from Oxford in disguise and risked his fortunes by joining the Scottish army at Newark, but was shortly afterward given up to the parliamentary commissioners. The king was tried in January, 1649, and condemned and executed. The House of Lords was speedily abolished, and Cromwell became a permanent member of the new council of state.



OLIVER CROMWELL.

In the same year Cromwell proceeded to Ireland to crush out the rebellion by the Royalists, and was soon after appointed lord lieutenant and commander in chief of the army. At Drogheda he ordered the execution of the garrison of 2,800 who had refused to surrender, which was in accordance with the rules of war of the time, and in 1650 captured Wexford. He resigned his command in Ireland to Ireton, and at the request of Parliament proceeded at the head of an expedition against Scotland, where the Royalists had proclaimed Charles II. their king. The decisive victory at Dunbar on Sept. 3, 1650, and the total defeat of the Royalists just a year later made him the principal character in Britain. In 1653 he dissolved the *Long Parliament* with 300 soldiers, summoned a council of state,

and later chose a Parliament of representatives from the three kingdoms, commonly called the *Little Parliament* or the *Barebones Parliament.* A new Parliament was chosen fifteen months later, but, owing to the incapacity of that body, the affairs of the government were put into his hands. On Dec. 2, 1653, the council of officers declared Oliver Cromwell sole governor with the title of lord protector, after he refused the title of king. His government was liberal and well directed, and the country remained generally prosperous during his incumbency.

CROMWELL, Thomas, Earl of Essex, statesman, born at Putney, England, about 1485; died July 28, 1540. He descended from humble parents and his early education was limited, and for some time he was a clerk in a factory at Antwerp. In 1513 he returned to England, where he adopted a business career, and was employed as an agent of Cardinal Wolsey. He supported Henry VIII. and the Reformation, coöperated with Cranmer in opposing the supremacy of the Pope, and in 1534 became Secretary of State. Henry VIII. appreciated his service and made him Earl of Essex in 1540. He promoted the marriage of that king with Anne of Cleves, because she favored the Lutheran faith, but his part in this affair caused him to lose the favor of the king chiefly because the latter regarded her with disgust. The king assented to a bill of attainder against Cromwell, who was condemned and beheaded.

CRONJE (krŏn'yĕ), **Piet,** soldier, born in South Africa in 1835. He descended from a family of French exiles who settled in Holland after the revocation of the Edict of Nantes, and from early youth manifested a strong desire for independent government. In 1877 he took a prominent part against the British and demonstrated marked ability at Majuba Hill. He held an important command in the Boer army in the war of 1899–1900, commanding at Mafeking, Modder River, and Magersfontein. On Feb. 27, 1900, his army was compelled to surrender near Paardeburg, where he had successfully resisted a long siege. After the capture he was confined for some time on the island of Saint Helena. He died Feb. 4, 1911.

CRONSTADT. See **Kronstadt.**

CROOK (krŏŏk), **George,** soldier, born near Dayton, Ohio, Sept. 8, 1828; died March 21, 1890. He graduated at West Point in 1852 and entered the military service in California the same year, engaging in expeditions against the Indians for nine years. He served with distinction in the Civil War. In 1862 he was brevetted lieutenant colonel, engaged in the campaigns of Virginia and Maryland, and later participated in the battles of Tullahoma and Chickamauga. He was brevetted major general in 1865, and commanded the cavalry of the army of the Potomac until the close of the war. In 1872 he compelled the Pi-Utes and Apaches to submit, and in 1875 subdued the Cheyenne and Sioux Indians in the northwest. In 1882 he drove the Mormons and squatters from the Indian lands upon which they had encroached and the following year subdued the Chiricahuas. Owing to his valuable service, he was made brigadier general in 1873, and was promoted major general of the United States army in 1888. The Indians under his charge were wisely managed, numerous reforms were introduced, and they were paid in cash instead of store orders. His efforts induced many of the tribes to become self-supporting.

CROOKES (krŏŏks), **William,** physicist, born in London, England, June 17, 1832. He studied at the Royal College of Chemistry, superintended in the Radcliffe Observatory, and lectured on chemistry in the Science College of Chester. The *Chemical News* was founded by him in 1859 and the *Quarterly Journal of Science,* in 1864. In 1863 he became a fellow of the Royal Society, in 1876 was made vice president of the Chemical Society, and in 1880 was awarded the gold medal and 3,000 francs by the French Academy of Science. Among the discoveries due to his efforts is a process by which extreme vacua are produced in incandescent electric lighting; the Crookes tube, useful in Röentgen ray photography; an amalgamation process for separating silver and gold from their ores; and the invention of the radiometer. He made considerable progress in throwing light upon the origin and constitution of chemical elements. Among his many excellent writings on physical and other subjects are "Select Methods of Chemical Analysis," "Psychic Force and Modern Spiritualism," "Experiments with Psychical Phenomena," and "Correspondence upon Dr. Carpenter's Asserted Refutation of the Author's Experimental Proof of the Existence of a Hitherto Undetected Force."

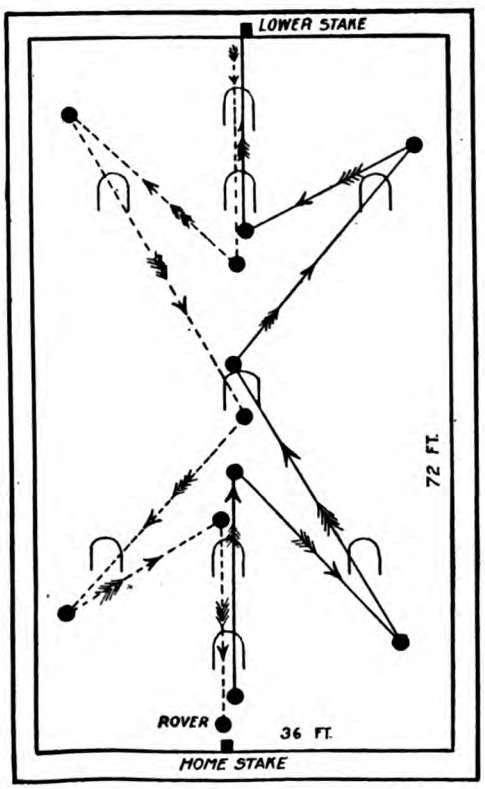
CROOKES TUBES, the sealed vessels from which the air has been exhausted to the extent that a high vacuum is obtained, and which have electrodes at opposite ends. They are so named from the inventor, Sir William Crookes, and are used to secure various effects of electrical discharge. By a high vacuum is meant one in which the gaseous pressure is not more than one-millionth of that of the atmosphere. Tubes somewhat similar were invented by Geissler, known as the *Geissler tubes.* They are of various forms and are supplied with platinum terminals and filled with different gases at different pressures. When the current of an electric machine is sent through them, it gives rise to many beautiful luminous effects. They are used in the spectrum analysis of gases and in the production of cathode rays.

CROOKSTON, a city in Minnesota, county seat of Polk County, on the Red Lake River, in the valley of the Red River of the North. It is on the Northern Pacific and the Great Northern railroads. The surrounding country is fertile, producing hay and cereals. The chief

buildings include the courthouse, the public library, a gymnasium, a business college, and the high school. Among the manufactures are flour, clothing, machinery, and farming implements. Systems of waterworks and electric lighting are maintained. It was settled in 1872 and incorporated in 1879. Population, 1905, 6,794; in 1910, 7,559.

CROPSEY (krŏp'sĕ), **Jasper Francis,** landscape painter, born in Rossville, N. Y., Feb. 14, 1823; died June 22, 1900. At first his attention was given to architecture, but soon after he turned to landscape painting. He visited France, Germany, England, Switzerland, and Italy in 1847, remaining three years in the last-mentioned country. He went abroad again in 1855 and resided seven years in London. His productions were exhibited at the Royal Academy and the International Exposition in 1862. In 1851 he was elected a member of the National Academy and of the American Water-Color Society. His most famous production is "Pontine Marshes."

CROQUET (krō-kā'), a popular open air game played by two or more persons with balls



CROQUET GROUNDS.

and mallets. The ground should measure 36 by 72 feet and be raised two inches at the border. Near each end of the ground is a *stake,* and nine *wickets* are set at convenient points between them. The game consists of driving a ball from the stake at the head of the ground through the wickets on the right hand side and to the stake at the foot of the ground, whence the ball is driven to the point of the beginning by way of the wickets to the left hand. When a ball has made the circuit of the field but has not touched the stake at the head of the ground, it is called a *rover* and may play on every other ball in the field in one turn. A complete croquet set consists of eight balls, painted in agreement with eight mallets, but in practice two or more persons play the game. The player loses his turn when he fails to drive the ball through a wicket, hence the game may be of considerable duration. Croquet is a very old game, but its popularity is of comparatively recent date. Interest in it is promoted in England and America by national and international associations.

CROSBY (krŏz'bĭ), **Frances Jane,** hymn writer, born at South East, N. Y., Mar. 24, 1820. When six weeks old she lost her eyesight, and at an early age was sent to the Institution for the Blind in New York City, which she attended nine years. Subsequently she was teacher of Greek and Roman history at that institution, but retired in 1858, when she married Alexander Van Alstyne. She is best known by her hymns, of which she published several thousand. They include "Pass Me Not, O Gentle Saviour," "I am Thine, O Lord," "Jesus is Calling," and "Safe in the Arms of Jesus." "Hazel Dell" and "There's Music in the Air" are among her compositions. Many of her secular poems were published in a volume entitled "The Blind Girl and Other Poems." She died Feb. 12, 1915.

CROSBY, Howard, Presbyterian clergyman, born in New York City, Feb. 27, 1826; died March 29, 1891. In 1844 he graduated at the University of New York. He became professor of Greek in that institution in 1851 and at Rutgers College in 1859, and was ordained a minister in 1861. He held appointments at New Brunswick, New Jersey, and in New York City. Degrees were conferred upon him by Harvard University and Columbia College, and he was made chancellor of the New York University in 1870, in which capacity he officiated for eleven years. He was a member of the New Testament Revision Committee of the American section, and aided in organizing the Society for the Prevention of Crime in 1877. Among his writings are "Humanity of Christ," "Bible Companions," "Lands of the Moslem," "Life of Jesus," "Seven Churches of Asia," "Commentary on the New Testament," and "Bible View of the Jewish Church."

CROSBY, Pierce, naval officer, born at Chester, Pa., Jan. 16, 1824; died at Washington, D. C., June 15, 1899. He was educated in a private school and elected midshipman from Pennsylvania in 1838. He served on various vessels from 1842 to 1860, and was assigned to duty in Chesapeake Bay at the opening of the

Civil War, in which he rendered efficient service in the Battle of Big Bethel and in attacks on forts Hatteras and Clark. He participated in the capture of New Orleans and in the Battle of Vicksburg. His commands were on the warships *Florida, Keystone State, Metacomet,* and *Shamokin.* In 1868 he was promoted to a captaincy, in 1874 to commodore, and in 1882 to rear admiral, and retired in 1883 after forty-eight years of active service.

CROSS, a figure produced by the intersection of two lines at right angles. In ancient times a cross was formed by fastening a piece of wood across an upright post or tree, which served for the execution of criminals by nailing or binding them in an upright position. Christ was crucified by nailing the hands and feet to the cross and securing the limbs by means of cords. The cross was adopted early as a symbol of Christian faith. It was carried by the legions of Christian warriors and was displayed in churches, cemeteries, and other places as a symbol of loyalty to the Christian cause. The cross is still a sign of distinction from the crescent used as a symbol by the Moslems, and is seen in Christian print, architecture, and worship.

CROSS, Ada Cambridge, novelist, born at Saint Germains, Norfolk, England, Nov. 21, 1844. In 1870 she married George Frederick Cross and sailed for Australia, after which she made her home in the colony of Victoria. She resided at Williamstown, a port of Melbourne, a number of years. Her novels have been widely read and are interesting for their accuracy in portraying human characters. Among her books are "Not All in Vain," "A Marriage Ceremony," "A Marked Man," "In Two Years' Time," "The Three Miss Kings," "Path and Goal," "A Platonic Friendship," and "Thirty Years in Australia."

CROSS, Mary Ann. See **Eliot, George.**

CROSS, Southern, the most conspicuous constellation in the Southern Hemisphere, seen near the Antarctic Circle. At a northern latitude of 30° it is at the southern horizon, but, owing to the haze and fog near the sea, it is not seen clearly north of the Tropic of Cancer. It contains four bright stars, to which Christian association and fancy give the shape of a cross. In 1679 it was added to the list of constellations by Olaus Römer (1644-1710).

CROSSBILL, the common name of several species of birds of the finch family, so named because the tips of the mandibles cross each other. The form of the bill gives them facility to shell pine cones to find the seeds, their principal food. The crossbills are found in the northern parts of North America and the colder parts of Asia and Europe. They attain a length of about seven inches. The male is reddish in color and the female is yellowish-green. Their nests are built in the limbs of trees, where they breed.

CROSS FERTILIZATION, the term used by botanists to describe the fertilization of plants by bringing the pollen from the stamens of a given species in contact with the pistils of another. This is done in the course of nature by insects, birds, or the movement of air. However, the term has a broader signification in the cultivation of plants, since it implies bringing together the generative parts of such flowers as will result in producing the best plants and improving the fruits borne by them. In-and-in breeding among animals is known to sterilize and degenerate, while cross breeding tends to so combine temperaments and physical structures that the offspring may be improved. This is true in a great measure with plants, and those interested in their culture single out the best species so as to have a combination of the stronger and better specimens.



CROSSBILL.

Cross fertilization in plants, like that in animals, must be guarded with considerable care, since species of vastly different characteristics do not produce the most healthful and serviceable offspring. Perhaps this is better illustrated in the human race, where crosses between individuals of vastly different races, such as the Caucasian and Ethiopian, do not result in an advantage to the race more highly developed. Bees, humming birds, and many insects are a prolific source of cross fertilization, and where botanists conduct experiments it is necessary to provide protection against their coming in contact with plants.

CROTON (krō'tŭn), a genus of plants which include herbs, shrubs, and trees. They occur in the warmer parts of both hemispheres. The leaves are variable and extremely acrid. Important medicines are obtained from the wood and seeds. Croton oil is expressed from the seeds of a number of species. It is brownish-yellow and has a nauseous taste. In large doses it is a dangerous poison, but in moderate quantities it acts as a drastic purgative, often causing vomiting. It is used as a counter irri-

tant for obstinate constipation and accidental poisoning. About thirty species occur in Mexico and the southern part of the United States.

CROTONA (krō-tō'nȧ), or **Croton,** an ancient Greek colony in the southern part of Italy, on both sides of the Aesarus River and on the east coast of the Bruttian peninsula. It was founded by Achaean colonists about 710 B. C., and grew rapidly in wealth and commercial importance. The disciples of Pythagoras became rulers of the city of Crotona about 530 B. C., and the colony furnished a large number of men during the war with Sybaris, about 510 B. C., but the Pythagoreans were soon after expelled. It suffered greatly during the war between the Romans and Pyrrhus, when it was plundered and nearly destroyed, and was overrun by its enemies in the second Punic War. The modern city is called Cotrone.

CROTON AQUEDUCT. See **Aqueduct.**

CROUP (krōōp), a common disease occurring mostly in young children. It takes the form of an inflammatory affection of the trachea and larynx, and arises largely from exposure to wet and cold and from digestive disturbances. It occurs most frequently at the ages of two and three years, and generally on the fourth or fifth day produces death by exhaustion and strangulation. The two forms of the disease are known as false croup and membranous croup. Both are attended by coughing. In *false croup* the child has a running from the nose and the breathing is labored and noisy. *Membranous croup* is due to the bacillus of diphtheria and is contagious and frequently fatal. Small pieces of membrane are coughed up in severe cases. The operation known as tracheotomy, which consists of inserting a tube into the windpipe below the inflamed tract, is often resorted to in this malady. The tube serves as a means of breathing.

CROW, the common name of any bird of the genus *Corvus,* of which the American crow is the type. The plumage is glossy black, the wings are long, and the beak is conical. About 200 species have been studied. They are intelligent and may be easily domesticated. Nearly all species build their nests on the limbs of trees, near which they perch and utter their harsh but familiar cry. The crow is widely distributed in all the continents and islands. Its favorite food consists of various kinds of carrion, but it feeds on fish, small quadrupeds, grains, and nuts, and delights to rob the nests of other birds and poultry of the eggs and young. Its habits are more or less gregarious, but it is frequently seen by itself or in isolated pairs. The crow of America is smaller than that of Europe, measuring about eighteen inches in length. The *fish crow* is found along the southern coasts, resembling the northern species, but is somewhat smaller. The *rook* is a small-sized species, has a peculiarly bare face, and is quite tame.

The crows are found in climates far north at all seasons of the year, but large numbers move southward in winter to warmer districts. The *hooded crow* has a small black tufted head, which is quite distinguishable from the gray body. It feeds on fish and carrion. Other species are found in Ceylon, where they live in towns, and several are native to New Zealand, New Guinea, and other islands. The *jabbering crow* of Jamaica has a peculiar and active voice.



HOODED CROW.

The jays, ravens, magpies, and jackdaws are closely related species. The flight of the crow family is not graceful, being marked by incessant flapping of wings, but most species are able to sustain the fatigue of traveling long distances. They usually fly in a direct line toward their destination, stopping to rest on the roadways or on the limbs of trees. Their scent is very marked, enabling them to detect and locate carrion at some distance.

CROW, the name of a tribe of North American Indians, a branch of the Sioux family. Formerly they inhabited the region of the upper Yellowstone and Missouri rivers, but they are now confined on a reservation in the State of Montana. They were friendly to the whites when the main branch of the Siouxs conducted a warfare against the settlers, and many of them were employed as guides and scouts. At present the total number is about 1,975.

CROWN, the name of a coin issued by several European countries. The English crown was originally a gold coin, first issued in 1527 by Henry VIII., but since 1551 it has been made wholly of silver. It is worth five shillings sterling, or about $1.23 in the money of Canada and the United States. The crown of Sweden, Norway, and Denmark is equivalent to about 26.5 cents, and that of Austria-Hungary has a monetary value of about twenty cents.

CROWN, the ornament worn on the head of

princes, kings, and emperors as a badge of sovereignty. Similar ornaments, called *coronets,* are worn by the nobility. The *tiara* is a decoration of the Pope. This custom is of considerable antiquity. The first King of Israel, Saul, wore a crown, and this is true of the King of Ammon. The first Roman sovereign who wore a crown was Tarquinius Priscus, in 616 B. C. In 306 A. D., when Constantine began to reign, he wore a crown. The practice was afterward extended to western monarchs, and later sovereigns were represented with crowned heads on coins. Many of the crowns are of great value. The crown worn by Queen Victoria had 227 pearls, four small rubies, one large ruby, seventeen sapphires, 147 table diamonds, 1,273 rose diamonds, and 1,363 brilliant diamonds. In the crown of the Prnice of Wales are the German words Ich Dien (I serve). The most celebrated crowns are those of Germany and Italy. The former is spoken of as the *silver crown,* but is a wealth of gold and gems. The latter is known as the *iron Lombard crown,* but is of solid gold, except that it contains an iron nail reputed to have been used at the crucifixion.

CROWN LANDS, in America, the lands located west of the English colonies. All of these lands were declared to be crown lands by a proclamation of Great Britain after the Treaty of Paris, in 1763, and they were held as reserves for the Indians and declared to be under the jurisdiction of the home government. The colonists were not permitted to make purchases of, or make settlement in, any of this reserve territory without the royal permission. The several states claimed these lands after the Revolution.

CROWN POINT, a town in Essex County, New York, on Lake Champlain, 110 miles north of Albany. It is on the Champlain Canal and the Delaware and Hudson Railroad. Iron ore and phosphate of lime are mined in the vicinity. It has a public library, electric lighting, and a number of churches. Crown Point is noted for the ruins of the fortifications constructed here by the British at a cost of about $10,000,000, although they are now in ruins. Seth Warner, at the head of a company of Green Mountain Boys, on May 11, 1775, captured the fort, which was garrisoned by only twelve men. Population, 1905, 1,890; in 1910, 1,690.

CROWTHER, Samuel Adjai, first negro bishop of Africa, born in Yoruba, Western Africa, in 1812; died Dec. 31, 1891. He was the son of a native named Adjai, was captured by Mohammedan slave traders in 1819, and liberated by the British in 1822, after being sold and exchanged several times. After liberation he was taken to Bathurst, the capital of British Cambodia, where he embraced Christianity in 1825 and assumed the name of an English vicar, by whom he was adopted. He accompanied the Niger expedition in 1841, acted as missionary and was sent to the Church Missionary College of London in 1842, and later was ordained by the bishop of London. In 1854 he accompanied the second Niger expedition, prosecuted missionary work, was consecrated bishop of the Niger Territory, and granted the honorary degree of doctor of divinity by Oxford University. The Royal Geographical Society of London presented him with a gold watch on account of valuable contributions to geographical knowledge. Besides translating a portion of the Scriptures into native languages, he wrote "Grammar and Vocabulary of the Yoruba Language," "Grammar and Vocabulary of the Nupe Language," and "Journal of an Expedition up the Niger and Tshadda Rivers in 1854." A history of this remarkable man was published in London in 1888, entitled "The Slave Boy Who Became Bishop of the Niger."

CROYDON (kroi'dŭn), a market town of England, in Surreyshire, ten miles south of London. It is located on several railway and electric railroad lines, and is a favorite residence suburb for merchants and business men of London. Among the principal buildings are a Gothic church, the Whitgift's Hospital, and a number of fine schools and charitable institutions. The manufactures embrace clocks, cotton and woolen goods, clothing, machinery, and spirituous liquors. Many fine drives and parks beautify the place, which was once the residence of the Archbishop of Canterbury. Its growth is comparatively recent, due largely to the development of many commercial and manufacturing enterprises. Population, 1911, 169,559.

CROZIER, William, inventor and artillery officer, born in Carrollton, Ohio, Feb. 19, 1855. He graduated at West Point in 1876 and was assigned to the Fourth Artillery, with which he took part in campaigns against the Indians. He was instructor of mathematics at West Point in 1879-84 and was made major and inspector general in 1898. President McKinley appointed him a delegate to the peace conference at The Hague in 1899, and the following year he served under Gen. Chaffee as chief ordnance officer in China. His inventions include a wire-wrapped rifle, a ten-inch gun, and the *Buffington-Crozier disappearing gun-carriage.* The last mentioned was invented in conjunction with Gen. Buffington and is used largely by the United States in coast-defense works. In 1917 he was made chief of ordnance in the war department.

CRUCIBLE (kru'sĭ-b'l), a vessel made of material which is capable of holding substances that are to be submitted to a high temperature, such as the material for melting metallic ores or those used in glass-making. The form is circular, conical, or triangular. The material used for making crucibles is either iron, porcelain, graphite, or platinum.

CRUELTY TO ANIMALS, The American Society for the Prevention of, an organization incorporated April 10, 1866. It was the first

society organized in America for the protection of animals. Henry Bergh was the founder and first president, and to his tireless energy and self-sacrifice the laudable work of protecting animals in a systematic way owes its origin. Through the efforts of this society the first law enacted in America for the protection of animals was passed by the Legislature of New York. The example was followed by the legislatures of other states, thus leading to much good in the care, use, and protection of all kinds of domestic animals. Branch organizations are now maintained in many parts of the United States and in other countries of America and the Eastern Hemisphere. Many cases have been attended by the society and its agents. The object is to prosecute offenders in the courts, temporarily suspend disabled animals from labor, humanely destroy animals that are past recovery, investigate complaints, and provide ambulances for the removal of disabled animals from the streets and highways for medical attendance. *Our Animal Friends*, a monthly magazine, is the official organ of the society, through which knowledge and interest is disseminated.

CRUELTY TO CHILDREN. See **Children, Society for the Prevention of Cruelty to.**

CRUIKSHANK (krōōk'shănk), **George**, pictorial satirist, born in London, England, Sept. 27, 1792; died Feb. 1, 1878. Both his father and eldest brother were cartoonists. At first his designs were for the stage, but he was induced by a publisher to engage in making sketches for children's books and as illustrations of songs. His first sketches for publication in periodicals were made in 1811 for *The Scourge*, on which publication he was employed five years. He engaged with the *Humorist* for a long period of years, beginning in 1819, and contributed to various other periodicals and publications. Among his most celebrated etchings were those of "Peter Schlemihl," Grimm's "German Popular Stories," Clark's "Three Courses and a Dessert," Dicken's "Oliver Twist," and Brough's "Life of Sir John Falstaff." The last work produced by him is the frontispiece to Mrs. Blewitt's "The Rose and the Lily." A number of his designs were devoted to an earnest protest against drunkenness, the most celebrated being the series of "The Bottle." He produced a number of excellent oil paintings, the most important being "The Worship of Bacchus."

CRUSADES (krụ-sādz'), the expeditions and wars conducted by the Christians of Europe to uphold the rights of pilgrims at Jerusalem, and ultimately to establish a firm foothold for Christianity in Asia. The Crusaders wore a cross made of white, red, or green woolen, sewed on the right shoulder of the dress, as a signal that they fought for the interests of the *Cross* as against the *Crescent* of the Moslem. Jerusalem and the Holy Sepulcher fell into the hands of the Mohammedans in their early conquest of Palestine. Notwithstanding, the Christian pilgrims still thronged to the Holy Land to worship on the scenes frequented by the Savior.

During the ascendency of the Saracens in the East the Christians were shown tolerable kindness, largely as a matter of policy, but when the Turks secured dominion widespread outrages were perpetrated. Many expeditions of pilgrims were insulted, pillaged, or murdered. The returning remnants spread complaints of Turkish insolence and barbarity throughout Europe, causing intense excitement and solicitude in the various nations. That they should be driven from the region embodying the most sacred interest of Christians, and the places of concern be occupied by a class foreign and adverse to everything pertaining to their spiritual welfare, led to a widespread desire to depose the Turks and establish Christianity on a firm basis in the East. The first general agitation of a Crusade to the Holy Land began in the latter part of the 10th century, when Pope Sylvester II. attempted to induce the Christian world to succor the afflicted of Jerusalem, but to this call only a feeble support was given by the people. However, later there were no less than eight great movements, including the *Children's Crusade*, to accomplish the object desired.

I. The first Crusade was induced largely by the agitation of Peter the Hermit, who traveled throughout Europe for that purpose and aroused general interest in the project. He was aided by Walter the Penniless and others interested in various parts of Europe. The Crusaders under Peter the Hermit numbered about 40,000, and under Walter the Penniless about 20,000, and besides these were about 15,000 Germans and various smaller organizations. As a whole, the participants were illy prepared, impatient, and poorly equipped to enter upon such an expedition. Later a stronger organization was led by Godfrey of Bouillon, Duke of Lorraine, and his brother Baldwin, Count of Flanders, aided by several others. Nice was taken in 1097; Antioch, in Syria, in 1098; and Jerusalem, in 1099, where a Christian kingdom was established with Godfrey of Bouillon as sovereign. Soon after the Battle of Ascalon was fought, in which he defeated the Sultan of Egypt. The first Crusade dates from 1096 to 1099. Palestine was in the hands of the actors of this Crusade for fifty years. During their dominion the two great military and religious orders were formed—the Knights of Jerusalem and the Knights Templar.

II. The second Crusade was undertaken in 1147 and ended in 1149. It was signaled by the fall of Edessa into the hands of the Mohammedans in 1144. Following this Bernard, abbot of Clairvaux, traveled over Europe preaching a second Crusade much as Peter the Hermit had preached the first. In 1147 Conrad III., Emperor of Germany, and Louis VII., King of France, took up the cross and started upon a

Crusade with more than 300,000 soldiers. They passed through Germany, Hungary, and over the straits into Asia. By the unfriendly schemes of Manuel, the Emperor of East Constantinople, the plan was frustrated and proved an entire failure. Conrad was defeated in the mountains of Cappadocia and returned in despair to Constantinople. Louis gained a slight triumph over the Saracens on the banks of the Meander and struggled on through storms and famine until he reached Antioch. There he was joined by Conrad. They united their forces and entered Jerusalem, but failed in their siege of Damascus.

III. The third Crusade dates from 1189 to 1192. It was agitated for a number of years, finding its greatest support in Italy, Germany and France. When the report was spread throughout Europe that Jerusalem had fallen before Saladin, the Sultan of Egypt, and that the golden cross which had glittered on the Mosque of Omar for 48 years had been trampled in the streets, the enterprise was assured. The Italian contingent sailed to relieve the Christians in the siege of Acre, which had yielded to Saladin. Later Richard I., of England, Frederick Barbarossa, of Germany, and Philip Augustus, of France, led large armies into Asia Minor. The armies of Philip and Richard were weather-beaten and sorely pressed, only 5,000 reaching Acre. A detachment sailing under Richard for the Holy Land was divided by a storm and driven to Cyprus. Jealousies arose between Richard and Philip, after which the latter returned to France and the former was successful in several engagements by which he excited the admiration of the Saracens. A truce followed for a time with Saladin, in which the latter was left potentate in possession of Jerusalem.

IV. The fourth Crusade was brought about largely through the efforts of Pope Innocent III., and covers the period between 1195 and 1197. In these expeditions the Western Christians captured Constantinople from the Greeks in the East and founded a Latin kingdom which endured fifty-seven years. During the siege of Constantinople many precious works of art were destroyed and much of the city was burned. The purpose was to build up a permanent power against the Moslems but in this the enterprise failed.

V. The fifth Crusade dates from 1198 to 1204. It resulted in a second siege of Constantinople terminating to the advantage of the besiegers. Baldwin, Count of Flanders, was elected emperor over one-fourth of the Eastern dominions and the remaining portion was divided between the republic of Venice and the barons of France. In the meantime the *Crusade of Children* was organized in 1212. About 30,000 boys and girls of France and 40,000 of Germany crossed the Alps and pushed forward with the expectation that the Moslems would embrace Christianity by miracles. Large numbers of them became discouraged and returned home, while others perished, were sold into slavery, or lost at sea. Frederick II., Emperor of Germany, proceeded to Jerusalem in 1227, where he secured a treaty with the Sultan of Egypt without expenditure of human life, under which he was crowned King of Jerusalem. However, he returned to Germany in 1229.

VI. The sixth Crusade was conducted by Louis IX., King of France, from 1248 to 1254. He was taken prisoner in Egypt, but secured his release by paying an enormous ransom. From Egypt he went to the Holy Land, where he built a number of forts, but soon returned to France.

VII. The seventh Crusade was started by Louis IX., of France, in 1270, but he died of pestilence in Tunis. He had been associated with Prince Edward of England, later Edward I., who landed at Acre in 1271. Nothing was accomplished aside from a truce of ten years. Subsequently several other efforts to secure a permanent foothold were made, but they were greatly weakened by those undertaken in the early period of the movement. The Latin kingdom of Jerusalem expired in 1291.

The most important events of the Crusades include the capture of Jerusalem by the Crusaders in 1099. It was retaken by Saladin in 1187, restored to the Christians by a truce in 1227, and taken by the Turks in 1239. The empire founded by the Crusaders expired with the capture of Acre by the Sultan of Egypt in 1291. The Crusades with their attendant interests were promoted about two centuries and had a marked impression upon the several kingdoms of Europe. Immense sums of money were spent without securing productive returns, millions of lives were lost, and marked changes were wrought in the habits and customs of European nations. After these conflicts were over, attention again turned to commerce, the laboring classes receiving a new impulse. During this period the germs of new ideas were sown in inquiring minds, and bigotry and imperialism rapidly diminished. While attended by some elements of harm, they broke up old feudal systems and paved the way for vast commercial and industrial enterprises.

CRUSTACEA (krŭs-tā'shē-ȧ), a class of aquatic arthropods, so named from the hard armor which covers the whole body. About ten thousand species are included in this group of animal life. The shell of the body is jointed, forming the principal part of the skeleton, and each joint or segment of the body has a pair of jointed appendages. Two of the appendages are usually modified into antennae or feelers, below or back of which is the apparatus for eating. The higher classes have the bodies divided into three parts: the head, thorax, and abdomen. All are oviparous and the sexes are distinct in most species. The crust or shell is cast off in one piece when it gets too small for the

growing body and a new one better fitted develops. Limbs lost by accident or in combat are replaced by new growth in a short time. The outer hard shell consists of many parts and allows movements by being jointed much like the joints formed by cartilages in higher forms of life. Some species of the crustacea have compound eyes borne upon long stalks, a pair of jointed feelers, and gill-like appendages for breathing. Various species occur in the seas, in fresh water, and on land. Fossil remains of these animal forms have aided greatly in studying the age of strata. Among the familiar examples of the living crustaceans are the lobsters, crawfishes, barnacles, and shrimps.

CRYOLITE (krī'ō-līt), a compound of sodium, aluminum, and fluorine, so named from its fusibility in the flame of a candle. In a pure state it is snow-white, partially transparent, and has a vitreous luster. It is used in the manufacture of soda and in making a beautiful glass somewhat resembling porcelain, and is a source of sodium hydrate, sodium carbonate, and other salts. Cryolite is found chiefly near Arksuk, Greenland, and in El Paso County, California.

CRYPT (krĭpt), a chamber under a church or beneath a monument to receive the bodies of the dead. Originally the term was applied to a subterranean chapel in the catacombs and later it designated a room near the confessional, of which it was an extension or enlargement. Crypts were constructed very largely in the churches from the ninth to the thirteenth century and many are of beautiful construction. The crypt under the cathedral at Glasgow, Scotland, is one of the finest examples. Others of note include those in the Cathedral of Canterbury, the Church of Saint Mark at Venice, the Cathedral of Strassburg, Germany, and the Sainte Chapelle, Paris.

CRYPTOGAMOUS PLANTS (krĭp-tŏg'ă-mŭs), or **Cryptogams,** the name applied by Linnaeus to all the plants that do not reproduce by flowering. The seed-bearing plants, to distinguish them from the crytpogams, are usually called *phanerogams.* Formerly it was thought that the distinction between the two classes should be based upon the theory that the crytogams reproduce by spores and the phanerogams by seed, but this view is not correct, since both groups include representatives that produce spores, but the former do not produce seeds.

CRYPTOGRAPHY (krĭp-tŏg'rà-fy), a system of writing with sympathetic ink, or with secret characters or ciphers. The most common method is to choose a sign or mark for every letter of the alphabet, using the substituted characters in committing the subject-matter to writing.

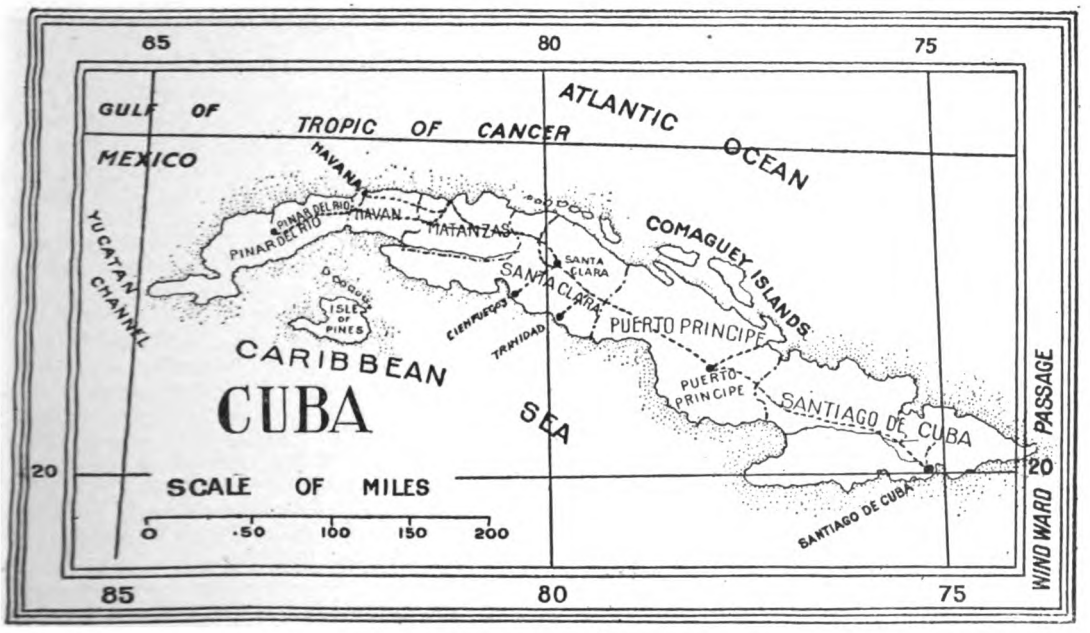
CRYSTAL (krĭs'tąl), in mineralogy and chemistry, the solid mathematical form which a chemically homogeneous body tends to assume by undisturbed and mutual attraction of its particles. Crystals may be developed by dissolving crystalline bodies in water, alcohol, or other fluids, and then abstracting the fluid by evaporation. Crystalline forms occur largely in nature. The study of their structure and the laws by which they are formed is called crystallography, which is an essential division of mineralogy.

CRYSTALLOGRAPHY (krĭs-tąl-lŏg'rà-fy), the science of crystallization, which investigates the system of form among crystals, and treats of their structure and method of formation. A crystal is bounded by plane surfaces, which have a symmetrical arrangement around certain imaginary lines called *axes.* Crystals are formed in all inorganic substances when solidifying, whether natural or artificial, and many thousands of forms are thus produced. Since the qualities of crystals depend directly on the forces of the ultimate molecules or particles of matter, crystallography constitutes an important department of molecular physics and is concerned in the study of cohesive attraction. All solidification in inorganic substances is crystallization, hence cohesive attraction in solidification consists wholly of crystallogenic attraction.

The very numerous forms of crystals may be classified under six systems. 1. The *monometric system,* in which the crystals have three lines or axes of equal length, hence are of one kind, include such crystals as are formed by silver, gold, iron pyrites, and common salt. All the forms of this system are symmetrical. 2. The *diametric system* has axes of two kinds, the lateral axes being equal to each other, but differing in length from the vertical axis. Under this system crystallization is in the form of square octahedrons, equilateral eight-sided prisms, eight-sided double pyramids, and in a number of other forms. Among the examples are the crystals of tin idocrase and calomel. 3. The *trimetric system* includes the forms in which the vertical axis is unequal to the lateral and the two lateral axes are unequal to each other, hence the three axes are all of unequal length. The crystalline forms are right rhombic prisms and rhombic-based octahedrons. The examples include topaz, sulphur, epsom salt, and heavy spar. 4. The *monoclinic system* includes the crystals in which two of the axes are at right angles to each other and the third is inclined. All the axes are of different lengths and the crystals are oblique rhombic prisms. Copperas, borax, sugar, and carbonate of soda crystallize according to this system. 5. The *triclinic system* includes the crystals that have three axes of unequal length, all the three intersections being oblique. The forms are oblique prisms contained under rhomboidal faces. The crystals of this system include those of sulphate of manganese and blue vitriol. 6. The *hexagonal system* includes the regular hexag-

onal prisms, in which the vertical axis connects the centers of the bases, and the three lateral axes join the centers of the opposite lateral faces or edges. It also includes the rhombohedron and its derivative forms. Among the crystals are those of many kinds of limestone and emerald.

CUBA (kū'bȧ), a republic in the West Indies, on the island of Cuba, the largest and most important of the Greater Antilles. It is situated mainly between latitudes 19° 20′ and 23° 8′ north and longitude 78° and 85° west, and between the Gulf of Mexico and the Caribbean Sea. The coast line is very extensive, containing numerous inlets and safe harbors. The northern coast is about 818 miles long and the southern 972 miles, the former having thirty-two harbors and the latter twelve. From east to west the island has a length of 760 miles, with an average width of eighty miles, and the area, including a number of small islands, is 45,881 square miles.



DESCRIPTION. A range of mountains extends from southeast to northwest across the island, known as the Copper Mountains, which vary in height from 1,000 to 4,000 feet. The most elevated summits are in the southeastern part, where Turquino, the culminating peak, rises to a height of 8,320 feet. Low and marshy lands lie west of Cape Cruz, near which is located the great Zapota swamp. Coral islands or reefs border the northern coast.

Cuba has no large rivers, but its streams that may be classed as rivers exceed 150 in number and only few of these are navigable. The Cauto, wholly in the province of Santiago de Cuba, is the largest stream. It is about 150 miles long and is navigable for a distance of fifty miles. The climate is variable inland, but along the coast it is very equable. At Havana the rainfall is about fifty inches and in the northeastern section it ranges from 80 to 100 inches, but the southeastern region has a smaller precipitation. The winter season is marked by copious rainfall, but is not cold, while the summer breezes modify the temperature and render it quite pleasant in all portions. In summer the thermometer rarely rises above 90° and seldom falls below 85° in winter, but the mountainous regions have a lower temperature in winter, though rarely less than 50°. Normally the climate is healthful, but sickness prevails along the low coasts and in the marshy districts.

Cuba has a tropical vegetation and many of the plants are luxuriant. The prairies abound with nutritious grasses and fully one-half of the surface is covered with forests, including the palm, mahogany, cedar, lignum-vitae, logwood, rosewood, acana, and Cuban ebony. Many species of fruit are native or have been naturalized. Animal life is abundant, especially birds, of which there are more than 200 species. They include the vulture, grouse, snipe, quail, wild turkey, and many birds of song. The reptiles are represented by the alligator, lizard, tree toad, and turtle. Many species of insects abound, including the scorpion, tarantula, firefly, ant, and a limitless number of others. The rabbit, bat, cat, and domestic animals are well represented. The waters of Cuba are rich in fish, including about 650 species.

MINING. Iron is found in the province of Santiago de Cuba, where it is mined in large quantities. The output is about 575,000 tons

annually, nearly all of which is exported to the United States. Asphalt, an important product, is obtained chiefly in the vicinity of the Bay of Cárdenas. Copper has been mined profitably for many years and prior to the discovery of the deposits in the United States it was exported largely for use in the American manufacturing enterprises. Salt, gold, silver, petroleum, manganese, and a number of other minerals are found in paying quantities.

AGRICULTURE. Owing to the genial climate and general fertility of the soil, agriculture is the leading industry. Many of the cultivated fields have been tilled fully 200 years without artificial fertilization and their riches have not been perceptibly affected. Much of the land is divided into small tracts, ranging from eight to twenty acres, and few of the holdings exceed 100 acres, except in localities where larger plantations are managed by white owners. Nearly half of the farmers are colored tenants, who are confined almost exclusively to small tracts of lands. Agriculture was set back materially during the war with Spain, in 1897, but at present it is conducted with much profit.

Sugar cane has been cultivated since 1523 and takes rank as the most important product. The sugar plantations are operated on large holdings, usually several thousand acres, and they are equipped with private railways, plants to manufacture sugar, and numerous buildings for the occupancy of the laborers. Tobacco takes rank next to sugar as an important crop, and it has been cultivated with considerable success since 1580. The provinces of Havana and Santa Clara are the chief centers of the tobacco fields. Maize is cultivated in all parts of the island and rice is grown extensively, but the latter does not yield sufficient for domestic consumption. Wheat and oats are not cultivated extensively, but vegetables, especially sweet potatoes, are grown in all parts of the island. Cocoanuts, lemons, limes, mangoes, guavas, figs, oranges, and pineapples are cultivated abundantly. Cattle, horses, swine, sheep, and poultry yield large returns.

MANUFACTURES. Sugar and tobacco products are the principal manufactures. The former consists chiefly of raw sugar and is made on the plantations largely as an adjunct of agriculture. Havana is important as a manufacturing center of cigars and smoking tobacco, large quantities of which are exported. Other manufactures include clothing, rum, flour, cordage, fabrics, and earthenware.

COMMERCE AND TRANSPORTATION. Havana, the principal seaport, is the focus of many routes in steamship navigation and is touched by numerous transatlantic routes. Cienfuegos and Santiago de Cuba, both on the southern coast, are the centers of a growing foreign and interior trade. The exports somewhat exceed the imports, and most of the foreign trade is with the United States, Great Britain, and Germany in the order named. Railroad construction has advanced rapidly within the last two decades. Lines traverse the island from Pinar del Rio in the west to Santiago de Cuba in the east, connecting all the more important cities. The lines aggregate a total of 1,700 miles, though some are in a poor condition, and about 4,500 miles of telegraph lines are in operation. Comparatively little has been done in constructing wagon roads, which are in a poor state of development.

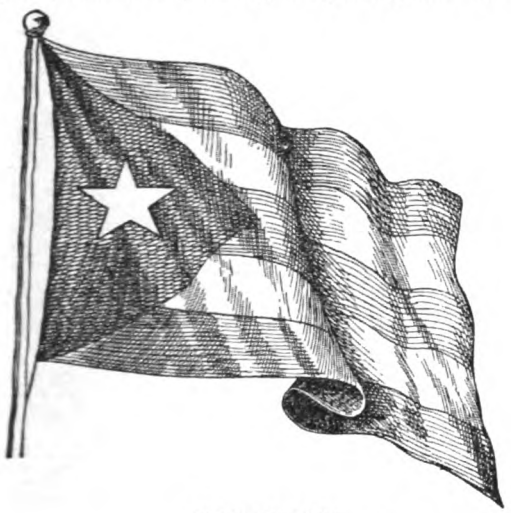
EDUCATION. The constitution provides for free and compulsory attendance upon primary schools, which are maintained by the provinces and municipalities, but the central government may bear the expense in localities where the people are unable to make ample provisions for instruction. Secondary and higher education is under control of the state and culminates in a university at Havana. A large number of teachers from Cuba received normal training in the United States after the organization of the republic, and since then considerable progress has been made in public instruction. Many private and parochial schools are maintained, owing to the fact that the inhabitants are largely Roman Catholics.

INHABITANTS. The province of Havana is densely populated, having 187 persons to the square mile. About seventy per cent. of the people are white, and the remainder are negroes, mixed elements, and Chinese. Nearly half engage in agriculture, about one-fifth in domestic service, and one-seventh in mechanical and manufacturing pursuits. Havana, the capital, is the largest city and most important commercial center of the West Indies. Santiago de Cuba, Cienfuegos, Matanzas, Pinar del Rio, Cárdenas, and Puerto Príncipe are among the leading cities. The last two censuses were taken under the direction of the Secretary of the Government, in 1907 and in 1911, from which the following table has been prepared:

PROVINCES.	POPULATION, 1911.	POPULATION, 1907.
Havana	576,546	518,524
Pinar del Rio	254,620	240,781
Matanzas	259,841	239,866
Santa Clara	514,325	457,897
Puerto Principe	135,340	117,432
Santiago de Cuba	482,612	453,782
Total	2,223,284	2,028,282

GOVERNMENT. Cuba is governed under a constitution adopted in 1901, by which the administration is vested in a president, who is elected by manhood suffrage for a term of four years and is limited to a service of not more than two consecutive terms. It is required that the president be a native Cuban or a naturalized citizen who served not less than ten years in the Cuban army during the wars for independence. The members of his cabinet, who are responsible to him for the administration of their offices, are appointed and removed at his pleasure. A congress of two departments, the senate and

house of representatives, has full legislative power. The former is composed of twenty-four senators, that is, four from each province, elected by an electoral board of the provincial councilmen and electors, and hold office for a term of four years. Representation in the lower branch of congress is on a basis of one member for every 25,000 inhabitants, or a fraction of more than 12,500, and the term is for four years, one-half retiring every two years. Congress, which meets annually, has general control of the finances and foreign affairs, and has legislative power in matters concerning the republic. The chief judicial power is vested in a supreme court, members of which are appointed by the president subject to confirmation by the senate. Citizenship was extended to all Cuban and Spanish residents who were on the island Sept. 11, 1899, and to all foreigners who resided here since Jan. 1, 1899, and those not included in these classes may acquire citizenship by naturalization, which requires a residence of five years.



FLAG OF CUBA.

The six provinces of Cuba are Havana, Pinar del Rio, Santa Clara, Matanzas, Puerto Principe, and Santiago de Cuba. Each of these has the power to legislate and administrate in regard to matters of local concern, but their laws and administration are subject to the constitution of the republic. Members of the provincial assemblies as well as the governors are elected by popular vote. Spanish is the official and spoken language, but it is mixed somewhat with native dialects.

HISTORY. Cuba was discovered by Columbus in 1492 while on his first voyage to America. It was first named Juana in honor of Prince John, son of Ferdinand and Isabella, and later received the name of Fernandina. Afterward its name was changed to Santiago in honor of the patron saint of Spain, and still later to Ave Maria in honor of the Virgin Mary. The name applied to it at present is the one by which the natives knew it at the time of its discovery. The aboriginies were a peaceful, semisavage people, who lived in tranquillity and possessed some degree of development in rude industry and a primitive form of religion. Columbus revisited the island twice after its discovery, in 1494 and in 1502. Diego Columbus, son of Christopher, organized an expedition of 300 men under Diego Velasquez and founded the first permanent settlement in 1511. The first settlements in Santiago and Trinidad were formed in 1514, and the present city of Havana was founded in 1519. In the first quarter of the 19th century all the continental colonies controlled by Spain secured their independence, but Cuba and Porto Rico remained faithful to the mother country. Many of the Spaniards remaining loyal to the mother government left the continental possessions and took refuge in these islands, thereby enriching them with their skill, energy, and capital. The cultivation of sugar cane and tobacco was early developed, and, with the income of large capital and superior skill, made rapid progress, soon replenishing the coffers of Spain, which had been drained by continuous foreign wars.

The colony of Cuba was a seat of contention whenever Spain engaged in war with European countries. Havana was destroyed in 1534 and again in 1554 by the French. The Dutch captured it in 1624 and the English in 1762. Beginning in 1810, it was governed by a foreign captain general. Excessive taxation and other differences caused numerous dissensions, which led to a rebellion in 1836 and to insurrections in 1844 and 1848. A number of parties in the United States coveted the possession of the island, particularly the slave-holding interests, and offered to buy it with the intention of making it a permanent possession. In 1850-51 Narciso Lopez was assisted by adventurers, known as filibusters, from the United States, in an attempt to seize the island, but the expedition was expelled by the Cubans. The United States issued the Ostend Manifesto in 1854, which declared that the island would be seized if Spain refused to sell it. Soon after a strong party for liberation from Spain was formed, and Maximo Gomez conducted a war for Cuban independence during a period of ten years, beginning in 1868. It was terminated by the Elzanjon Treaty in 1878 with the acting captain general, Martinez Campos. The treaty provided for the early abolition of slavery and guaranteed certain personal and political rights to the Cubans. Slavery was abolished in 1886, but the policy of Spain remained as before in the interest of the mother country, rather than for the benefit of the colony.

Conditions rapidly formed that led to the Cuban revolution of 1895. The native patriots were aided by the Cuban exiles, the latter having

their headquarters at New York. Secret preparations were carried forward with remarkable rapidity, arms and ammunition were smuggled into Cuba, and a formal declaration of war was made Feb. 24, 1895. The revolutionary forces were placed under the command of Maximo Gomez, who was supported with alacrity by the negroes and by the inhabitants of Porto Rico. The warfare carried on by the revolutionists partook of a guerrilla form, being mostly raids upon plantations and cities. Afterward the forces fell back into the mountain districts, where they were secure against Spanish troops, but came forward successively with surprises to the Spaniards. Antonio Maceo landed in Cuba in the spring of 1895 and was hailed with much enthusiasm by the patriots. The total forces of the Spaniards numbered 200,000, while the insurgents had about 60,000. Gen. Valeriano Weyler, governor general, carried on the war with much cruelty, whereby needless loss of property and life was occasioned. The people of the United States manifested a decided feeling of friendliness toward the patriots, who were struggling for liberty as the early colonists had done in 1776. This occasioned a feeling of hatred on the part of the Spanish sympathizers against the United States, and culminated in the destruction of the United States battleship *Maine* then on a friendly visit to Havana, by a submarine mine, on Feb. 15, 1898, in which 262 men and officers lost their lives. A commission to investigate the conditions surrounding the destruction of the *Maine* was appointed by the President of the United States, and the report following the investigation intensified the feeling of hostility. War was formally declared on April 21.

The first decisive engagement of the Spanish-American War resulted in the destruction of the Asiatic fleet of Spain at Manila, in the Philippines, on May 1. On July 3 the strongest fleet of Spain was destroyed at Santiago by the Americans, Rear Admiral Schley commanding in action. Gen. Shafter laid siege to Santiago with the United States army and fought a decisive battle on July 1. Gen. Toral surrendered his army of 25,000 men to the Americans on July 17. The surrender of the remaining portion soon followed and the final treaty of peace was signed at Paris on Dec. 10, 1898. By its terms Spain ceded Porto Rico to the United States and relinquished all sovereignty over Cuba and the Philippine Islands. As a partial consideration to secure the relinquishment of the latter, the United States paid $20,000,000. The treaty was ratified by the Senate on Feb. 6, 1899, by a vote of sixty-one yeas to twenty-nine nays, one vote more than the two-thirds majority requisite.

The first president, Tomas Estrada Palma, was elected in 1901, and the United States, having exercised supervisory functions in aiding to establish the government, withdrew formally on May 20, 1902. He was reëlected to the presidency in 1905, and the following year his chief opponent raised an insurrection and tried to overthrow the government. The rebellion operated to destroy social order and render the national army powerless, hence the United States intervened. President Palma resigned and Charles E. Magoon (born in 1861) administered the affairs as military governor under the direction of the United States. This condition continued until January, 1909, when José Miguel Gomez, a member of the Liberal party, was inaugurated as president. His administration issued bonds to promote internal improvements. Mario Menocal was elected in 1912 to succeed him as president, and was re-elected in 1916.

CUBE, in geometry, a solid body with six equal square faces. A body in which the volume is one cubic inch has six equal faces, each of which is one inch square. The volume of a cube is found by multiplying the length by the breadth and the product by the height; thus, 27 is the cube of 3, being equal to 3x3x3. The number which is thus multiplied to make the cube is called the *cube root.* The problem of the duplication of the cube, or of constructing a cube of twice the volume of a given cube, is a famous mathematical problem which interested geometers in the time of Plato.

CUBEBS (kū'bĕbs), the berries of a perennial plant of the pepper family, native to New Guinea and the West Indies. The berries are gathered before they ripen, and when dried are about the size of small peas and have a dark brown color. They yield a volatile oil, wax, resin, and cubebic, all of which are used in medicine, chiefly for the treatment of indigestion, chronic catarrh, and affections of the mucous membrane.

CUCKOO (kŏŏk'o͞o), a widely distributed genus of birds which belong to the climbers. They are most abundant in Eurasia and Africa,



CUCKOO.

though a considerable number of species occur in America. The species of America are distinguished from others in that they hatch their own eggs, while those of the old world lay their eggs to be incubated in the nests of other

birds. Their custom is to lay one egg in the nests of a number of birds, preferring the yellow-hammer, titlark, hedge sparrows, green linnets, and water wagtails. The young usually seek to monopolize the nests of their foster parents. It requires about five weeks to develop the bird sufficiently for fledging. The color of most species is ashy-gray, the belly is white, the tail is spotted, and the legs are light yellow. The African cuckoo attains a length of about fourteen inches. Its peculiar *coo-coo* cry heralds its return in the spring. The food consists of dragon flies, moths, caterpillars, and other insects. There seems to be a preponderance of males as compared with females in the ratio of about four to one. The species of the old world reach Central Europe in April from Northern Africa. The American species are about twelve inches long, and olive-green in color, and are found more or less widely distributed over the entire continent. In the spring they penetrate far into Canada, but move southward to winter in the warmer regions of the continent and in the West Indies.

CUCUMBER (kū'kŭm-bĕr), a genus of plants distinguished by their heart-shaped leaves, trailing stems, and conisexual male and female flowers in the axils of the leaf stalks. They are native to Egypt and the southern part of Asia, but were brought to Western Europe during the Crusades and to America shortly after its discovery. Several species form an important food product, both for use in the fresh state and for pickling purposes. The fruit product is valued only in an immature or green state, turning yellow and tough at maturity. The plant is attacked by the grub of several insects known generally as *cucumber beetles,* and both the young and the mature insects feed upon the leaves of the vine.

CUCUMBER TREE, a forest tree native to North America, so named from its fruit, which resembles a small cucumber. The tree grows to a height of from sixty to ninety feet, has a trunk about three to four feet in diameter, and the leaves are ovate and deciduous. The young leaf is downy and of a pale green color, but at maturity it is deep green and from seven to ten inches long. Owing to the lightness of the wood, it is used for making boats and troughs. The cucumber tree is confined to the warmer parts of the Temperate Zone and is found in the eastern section of the United States.

CUENCA (kwän'kä), a city of South America, in the Andean tablelands of eastern Ecuador, at a height of 8,650 feet above the level of the sea. It is the capital of the province of Azuay. Next to Quito, it is one of the most important cities, and has a cathedral and university, besides several other noted institutions. It has a considerable trade in minerals and merchandise. The city has a number of modern improvements, including waterworks, a library, and several parks. Population, 1916, 44,484.

CUFIC WRITING (kū'fĭk), an ancient form of Arabic writing, so named from the town of Cufa, in the pashalic of Bagdad. It is supposed to have been introduced in Arabia about the sixth century, when it came into use in writing manuscripts, marking coins, and in placing inscriptions on monuments. Cufic characters were used in copying the earliest editions of the Koran and it continued to be the form of writing until about the tenth century, after which it was used more generally in marking coins and inscriptions.

CUIRASSIER (kwē-rȧs-sēr'), a soldier armed with a cuirass. This armor consists of a breast and back plate, lapping on the shoulders and buckled together beneath the arms. It has remained in use longer than any other form of defensive armor for the body and is still used in the heavy cavalry of some armies of Europe. The early cuirass employed by the Greeks was of linen, while the Romans made this armor of flexible bands of steel. Several regiments of cuirassiers were organized by Napoleon and maintained for effective service. A body of French cuirassiers swept across the plain to embarrass the British army in the first Battle of Waterloo. Cavalry equipped in this way is maintained by most European powers as an essential part of their armies.

CULBERSON (kŭl'bĕr-sŭn), **Charles A.,** public man, born at Dadeville, Ala., June 10, 1855. His father, David B. Culberson, was prominent as a Congressman from Texas for twenty-two years. The son studied at the Virginia Military Institute, where he graduated in 1874, took a course of law at the University of Virginia, and subsequently settled in Texas. In 1890 he was elected attorney-general of the State, became Governor in 1894, and attended many of the Democratic national conventions. He was elected to succeed Roger Q. Mills in 1899 as United States Senator and was reëlected in 1905, in 1911, and in 1917.

CULLEN (kŭl'lĕn), **Maurice Galbraith,** painter, born at Saint Johns, Newfoundland, in 1866. He received his early education in Canada and in 1888 went to Paris, France, to study painting at the Beaux Arts under Delauny. In 1884 he exhibited for the first time at the New Salon. Soon after he returned to America and established his home at Beauport, Quebec, but traveled extensively in Europe and other continents. His paintings are chiefly landscape views and those presenting winter scenes are best known.

CULLODEN MOOR (kŭl-lŏd'ẹn mo͝or), a Scottish heath five miles east of Inverness, celebrated for the decisive battle fought on April 27, 1746, between Prince Charles Stuart and the Duke of Cumberland. It was the last battle fought on Scottish soil, and ended all attempts of the Stuarts to recover the throne of England. Prince Charles was the pretender and was supported by a small army of Highlanders, who

were in an unfit condition for battle, owing to exertion in marching, and soon fled before the disciplined troops and artillery of the Duke of Cumberland.

CULLOM, Shelby Moore, statesman, born in Wayne County, Kentucky, Nov. 22, 1829. He studied law and practiced at Springfield, Ill. In 1856 he was chosen to the State Legislature, was reëlected four years later, and was elected to Congress in 1865. He returned to the State Legislature in 1872 and became Governor in 1876, to which office he was reëlected in 1880, but resigned Feb. 5, 1883, to succeed David Davis in the United States Senate. He was reëlected for the term ending March, 1885, for the term ending in 1891, for the term ending in 1907, and again for the term ending in 1913. In 1872 he made the nomination speech for Gen. Grant and in 1884 placed Gen. Logan in nomination. His activity in Congress established for him a high reputation among the leading statesmen of America, and his influence in legislation has been effective. In 1898 he served as chairman of a commission of five to consider and report to Congress the questions of government pertaining to Hawaii. He died Jan. 28, 1914.

CULLUM, George Washington, soldier, born in New York, Feb. 25, 1809; died Feb. 28, 1892. He graduated at West Point in 1833, joined the engineer corps, and rose to the rank of colonel. Prior to the Civil War he was engaged in the construction of public works and fortifications at New York City, New London, Boston, New Bedford, and Charleston. At the beginning of the war he became aid-de-camp to Gen. Winfield Scott and later was commissioned brigadier general of volunteers. Subsequently he served as chief of staff to Gen. Halleck and was chief of engineers at the siege of Corinth, erecting many important structures. After the war he was superintendent of the United States Military Academy at West Point, later served on a board of engineers in constructing defenses, and retired from active service in 1874. The remainder of his life was devoted to scientific and military branches and literature. Among his writings are "System of Military Bridges in Use in the United States Army" and "Campaigns of the War of 1812."

CUMAE (kū'mē), a Greek city of ancient Italy, in Campania, ten miles west of Naples. It was situated on the Mediterranean, founded by colonists from Chalcis in Euboea and Cymae in Asia Minor, and was noted for its extensive commerce. Citizens of Cumae built a number of port towns, including Naples and Messina. It was the most important city in the southern part of Italy for 200 years, between 700 and 500 B. C. It was attacked by the Etruscans, who came in contact with it as a maritime power, and it was conquered by the Samnites in 417 B. C. Hannibal failed to capture it in the Second Punic War and it held out as the last stronghold of the Goths in Italy, but was taken in 552 A. D., by the Byzantine army. The Saracens burned it in the ninth century and it was totally destroyed by the people of Naples in 1205.

CUMANÁ (kōō-mä-nä'), a city of Venezuela, in the state of Bermudez, on the Gulf of Cariaco. It is located near the mouth of the Manzanares River, in a hot and unhealthful climate, but has a large export trade in sugar, hides, coffee, and tobacco. The chief buildings include a college, a cathedral, and a number of government buildings. It was founded in 1520 and is thought to be the oldest city in America. Near it are several suburban towns, including San Francisco and Serritos. Population, 1916, 15,350.

CUMBERLAND (kŭm'bĕr-lạnd), a city in Maryland, county seat of Allegany County, on the Potomac River and on the Pennsylvania, the Baltimore and Ohio, and other railroads. The chief buildings include the courthouse, the public library, an academy, and the high school. Gas and electric lighting, street railways, waterworks, and pavements are among the improvements. The surrounding country is rich in fertile soil and valuable deposits of bituminous coal. Among the manufactures are flour, ironware, carriages, clothing, cigars, machinery, cement, glass, and tin plate. It ranks second in size of the cities of the State. Cumberland was platted in 1785 and incorporated in 1815. The Chesapeake and Ohio Canal contributed to its early growth. Population, 1910, 21,839.

CUMBERLAND MOUNTAINS, a ridge of the Appalachian system, which forms a part of the boundary between Kentucky and Virginia and passes into Tennessee and Alabama. Its highest peaks rise about 2,800 feet above sea level. It is about fifty miles wide, well covered with maple, oak, hickory, chestnut, white ash, and pine timber, and is penetrated by numerous fertile valleys. Its mineral wealth consists of extensive coal, limestone, granite, and sandstone deposits.

CUMBERLAND RIVER, a tributary of the Ohio, rising in Kentucky. Its source is in the Cumberland Mountains, whence it flows toward the southwest into Tenessee, returns to Kentucky, and courses north until its waters unite with the Ohio. The total length is about 650 miles, of which 200 are navigable for steamboats in favorable seasons. A fall of sixty feet is near Williamsburg.

CUMBERLAND ROAD, a highway built by the United States government from Fort Cumberland, Md., to Vandalia, Ill., a distance of 800 miles. Congress authorized the President to appoint three commissioners to lay out the road and appropriated $30,000 to cover the expenses. Work was begun soon after and the road was completed in 1838. The total sum appropriated was $6,821,246. It was known as the Great National Pike and was controlled by the government until 1856, when the control was given to the various states in which the different

portions were located. This highway was important as an avenue for emigrants from the Eastern states to the West.

CUMMINS (kŭm'mĭnz), **Albert Baird,** public man, born in Carmichaels, Pa., Feb. 15, 1850. He attended public schools and in 1869 graduated at Waynesburg, and soon after went to Iowa. Subsequently he studied law in Chicago, and was admitted to the bar in 1875, and for three years practiced his profession in Chicago, after which he opened a law office in Des Moines and attained a reputation by successful work as a lawyer and business man. In 1887 he was elected a member of the State Legislature, and was three times chosen Governor of the State as a Republican, in 1901, 1904, and 1906. He was prominent as a representative of western Republicans for advocating *The Iowa Idea,* a movement favoring the gradual reduction of tariff on imports that do not come in direct competition with American production or are consumed in large quantities. In 1908 he was elected to the United States Senate, and was re-elected in 1914.

CUNARD (kû-närd'), **Sir Samuel,** founder of the Cunard line of Atlantic steamships, born at Halifax, Nova Scotia, in 1787; died in London, England, April 28, 1865. He was the son of a French Canadian merchant and received instruction for commercial pursuits. In the early development of steamship navigation he obtained a contract with the British government for the mail service, built four steam vessels, and established a regular line of communication between America and England. From this small beginning one of the largest and most important enterprises developed in the course of fifty years, which had prior to that time been unknown in ocean navigation. The first voyage was made from Liverpool to Boston between July 4 and 19, 1840. In 1852 the company substituted iron screw steamers in the place of wooden vessels with paddle wheels. The management and efficiency of the Cunard fleet have always been of the highest character, both in respect to personal security and commercial advantages.

CUNEIFORM (kû-nē'ĭ-fôrm), the name applied to various inscriptions that were made by the peoples of remote antiquity. The name is taken from the wedge-shaped characters that prevail largely. It is sometimes referred to as arrow-headed writing, from the resemblance that numerous strokes bear to the head of an arrow. Each of the hieroglyphic characters of the most ancient forms represents an idea or object, like the written characters of the Chinese, but they were corrupted later into forms found on the monuments of Babylon and Assyria. The early Accadians of Chaldaea, who spoke a language allied to the Turkish, invented the system and from them it was borrowed and modified by the Babylonians and Assyrians, who belonged to the Semitic races and spoke a language entirely different. Later it was used by the Persians and other races of Western Asia in a still greater modified state. The oldest form consists of about 700 characters; the remains of antiquity indicating that they were made in a period about 3,000 years B. C. The Accadian language ceased to be spoken about 1700 B. C., but it was employed in these writings for a longer period of time. Subsequent modifications made the characters partake more of the form of an alphabet, thus decreasing them in number but extending the meaning. Since the Persian cuneiform writings are among the latest, they contain about sixty characters, all having divers significations, but as a whole are greatly inferior in scope to the system of the highly cultured originators.

Cuneiform characters were regarded meaningless for centuries. By some they were thought to be the production of corrosive elements, others regarded them as ornaments, while still others looked upon them as records of hidden treasures. Karsten Niebuhr (1733-1815), a German historian and traveler, was one of the first to decipher them and give to them the vast value which they possess in preserving historic records of antiquity. He was followed by others, among them Rask, Grotefend, Lassen, and Rawlinson, by whose labors means of translation were slowly discovered and perfected.

The cuneiform inscriptions of Babylon and Assyria are particularly of value in that they throw light upon the discoveries, achievements, and governments of ancient peoples. Many of the inscriptions are devoted to a history of the reigns and wars of the kings. The Persian are of special interest since they throw light upon the reign of Darius and other Persian sovereigns. For the purpose of study cuneiform inscriptions are divided into four classes, according to the period in which they appear to have been made, the *Archaic, Hieratic, Assyrian,* and *Later Babylonian.* The most celebrated inscriptions are found at Behistun, where large portions of the history of Darius and his ancestors are cut upon the face of a rock 1,700 feet high. As a rule the inscriptions are found on objects made of stone, glass, bronze, clay, and iron. In the museums of Berlin, London, and other cities many excellent specimens may be seen.

CUPID (kū'pĭd), in mythology, the god of love, known to the Greeks by the name of Eros. He is described as a beautiful naked boy, armed with a bow and a full quiver of arrows, with which he kindles a desire for love in the human heart. Sometimes he is represented with a covering over his eyes, indicating that love may be blind. The darts sent from his bow are capable of piercing the birds of the air, the fishes of sea, and even the Olympian gods. He is represented as the son of Mercury and Venus.

CUPOLA (kū'pō-lä). See **Dome.**

CURAÇOA (kōō-rä-sō'), an island in the

Caribbean Sea, about forty-five miles north of Venezuela. It is forty miles long, eight miles wide, and has an area of 210 square miles. The principal harbor is Santa Anna and Willemstad is the local seat of government. The climate is hot and dry, while the surface is quite hilly and partly barren. Salt, sugar, tobacco, maize, and cochineal are the principal products. This island and Saba, Bonaire, Aruba, Saint Eustache, and a portion of Saint Martin constitute the colony of Holland known as Curaçoa. The entire area is 403 square miles. The government is administered by the Netherlands through a resident governor appointed by the sovereign. These islands were discovered by the Spaniards in 1527, taken by Holland in 1634, and conquered by England in 1798 and again in 1806, but were restored to Holland in 1814. The school system and commercial interests have been developed under Dutch control. A kind of bitter orange growing in these islands, known as Curaçoa, is exported to Holland, where it is used in the manufacture of Curaçoa liquor. Population, 1915, of the island, 31,090; of the colony, 53,466.

CURARE (kû-rā′rē), a poison used by the Indians of South America for poisoning their arrows, made chiefly from the juices of several plants. The principal ingredient is obtained from a tree which yields *nux vomica,* and to this product are added the scrapings obtained from the bark of several plants. Water is added to the component parts and boiled to form a consistence much like syrup. Death results from the poison when it is introduced into the blood, where it acts on and paralyzes the motor nerves, causing paralysis.

CURASSOW (kû-răs′sō), a large bird native to Mexico and South America, related to the partridges. The bill is strong, surmounted by a cere at the base, the wings are rounded, and in size these birds are similar to the turkey. Several species have been described, of which the *helmeted curassow* is the most noteworthy. It has a bony excrescence on the top of the head, which is bluish in color, and is somewhat larger in the males than in the females. The plumage is glossy black with a greenish hue on the breast. The flesh is eaten and resembles that of the turkey. This bird is reared in Guiana and has been domesticated in continental Europe.

CURFEW (kûr′fū), a signal given to the inhabitants of a town that the time to extinguish fire and lights and to retire has arrived. The usual time for ringing a curfew bell or signal is eight o'clock in the evening. The custom was introduced into England by William the Conqueror, and severe penalties were provided for those neglecting to comply with the requirements. In some countries a bell is rung in a similar manner for the purpose of indicating the time for evening prayer.

CURIE (kû-rē′), **Pierre,** scientist, born in Paris, France, May 15, 1859; died April 19, 1906. He studied at the Sorbonne, where he was granted the degree of doctor of science, and became a teacher in that institution. In 1895 he was made professor of physics and chemistry at the Sorbonne. Later he was appointed to the chair of general physics at the University of Paris, in which position he was succeeded, in 1906, by his wife, Marie Sklodowska, who was born at Warsaw, Nov. 7, 1867. She studied at a lyceum in her native city and at Paris, and for several years was professor of physics at the high school in Sèvres. In 1898 she and her husband announced the discovery of a new radio-active substance having the appearance of nearly pure barium and which became known as radium, the substance that revolutionized modern chemistry. M. and Mme. Curie published a number of books relating to educational and scientific topics.



PIERRE CURIE.

CURLEW (kûr′lū), a genus of birds of the same family as the woodcock and snipe and classed with the waders. The different species



CURLEW.

are widely distributed in most parts of the world. They inhabit marshy and wet regions. Most species have a bright ash color on the head and breast, with spots of red and white on the back and beneath. The bill is long and well adapted to catching animals under water, such as mollusks, fish, insects, slugs, and earthworms. The greenish eggs are deposited in a

nest made of dry leaves, usually in rushes. A number of species are prized as food and several in America have migratory habits.

CURLING, a game played with smooth stones, which are shaped somewhat like a teakettle, weighing from 30 to 45 pounds. A handle of iron or wood at the top enables the player to grasp it with a firm hold. Two games are usually played, known as the rink play and as playing for points. The *rink game* is played on ice, upon which a rink about ten yards wide and forty-two yards long is platted. The player endeavors to throw the curling stone as near the mark as possible, as well as to strike off that of his antagonist, in case the latter has thrown first. Two stones are thrown alternately from each end of the course or rink. In the game of *playing for points* there are no sides, but each player throws with the view of scoring for himself. Curling is a Scottish game and is played wherever settlements of Scotchmen are found. Match games played in a series are called *bonspiels.* Several national and international bonspiels are promoted in Canada and the United States. Interesting contests have been held between the champions of the two countries at Ottawa, Montreal, Winnipeg, Minneapolis, Chicago, Duluth, and other cities.

CURRAN (kûr'ran), **John Philpot,** celebrated orator, born at Newmarket, Ireland, July 24, 1750; died in London, England, Oct. 14, 1817. He was educated at Trinity College, London, studied for the profession of law, and began to practice at London. In 1775 he was called to the Irish bar and became distinguished for his humorous, flowery, and sarcastic speeches. He was elected to the Irish Parliament from Kilbeggan in 1782. His support was given to Grattan, and he warmly defended the cause of his Catholic countrymen against the policy of England. In consequence of the government not heeding his appeals, the people promoted the rebellion of 1798. He was a decided opponent of the union of Ireland with Great Britain and regarded such a step highly disastrous to his country. In 1806 he was appointed master of rolls in Ireland, which office he resigned in 1813. He spent his last three years in London and was thrown much into the society of Sheridan, Thomas Moore, and Erskine. His wit, humor, and gaiety made him a favorite member of society and his social qualities were greatly admired by his associates.

CURRANT (kûr'rant), the name of a fruit-bearing shrub cultivated in orchards and gardens for its fruit. It is grown most extensively in the Temperate zones. The different species are hardy shrubs, bearing abundantly under cultivation, and their fruit is valuable for food. It is eaten raw as a dessert and is used in cookery for jelly, preserves, and pies. In some localities it is grown for making vinegar and currant wines. Among the species cultivated largely in America and Europe are the red and white, the latter being a cultivated species of the red. The black currant yields abundantly in the colder regions and in the higher altitudes. Most species of currants ripen in May and June and are improved by training the shrubs against walls. The fruit grows in clustered bunches. The dried currants of market are made from the fruit of a small grape first cultivated on the Isthmus of Corinth, hence its name, but it has been naturalized in various climates. The fruit of this grape is small and is produced abundantly on the vines of the plants. Currant plants are greatly injured in the season when the fruit develops by the larvae of two sawflies. They are commonly called *currant worms.*

CURRENCY REFORM (kŭr'rĕn-sў), the policy advocated by a number of political parties in the United States since the early organization of the government as a means to reform the monetary system. It was the leading issue and reached its height of interest in the presidential campaign of 1896. The currency of the United States consists of gold, silver, nickel, copper, and paper money. Gold and silver were recognized as standard money of final redemption in the United States under various laws from the early organization of the government until in 1873, when the use of silver was partly limited by acts of legislation. Partially restored to its former position in 1878, it continued to be used as money with much of its monetary functions recognized until in 1900, when the single gold standard was given the validity of law by Congress. The theory of *bimetallism* and the issuance and control of paper currency by the government were advocated by the Democratic party, while the Republican party advocated a *single gold standard* and the enlargement of the functions of national banks. Partisans on both sides advocated their positions in Congressional and State elections and in Congress, which finally developed a line of national legislation relative to the issuance and control of the currency.

The position of the Democrats was supported by Senator Chandler of New Hampshire and other Republicans, while several Democrats supported the Republican position. The Democrats favored the continuance and use of both gold and silver as standard money. They demanded that the two metals should be coined into money of equal exchangeable value, the equality to be secured and maintained through international agreement, or otherwise, thus maintaining the parity in value of the coins of both metals. It committed the government to the establishment and maintenance of such a system of bimetallism as would insure parity at all times. They also held that the paper currency should be issued and controlled directly by the government, instead of through national banks, and favored the eventual payment of the national debt in coin. The position taken

by the Republicans in Congress was favorable to the single gold standard and a modification of the national banking system. That party, having a majority in both houses and the administration, enacted a law favorable to this position. It passed the Senate on March 6, 1900, and the House on March 13, becoming a law on March 14 by the signature of the President.

The law as passed contains ten sections. Among them are the following principal provisions: That the gold dollar of 25.8 grains, nine-tenths fine, shall be the standard unit of value, that all forms of United States money shall be maintained at parity with it, and that all treasury notes and greenbacks shall be redeemable in gold. The sum of $150,000,000 in gold is to be set apart by the treasurer for the redemption of these notes; he is to maintain this fund at not less than $100,000,000, and is empowered to issue United States bonds bearing interest at not over three per cent. The treasurer shall retire and cancel treasury notes equal in amount to the standard silver dollars that may be coined, and issue silver certificates against the silver so coined. Gold certificates shall be issued against the gold held in the treasury under certain provisions. The highest denomination of silver certificates shall by ten dollars, and the lowest denomination of the United States notes and treasury notes shall be ten dollars. The Secretary of the Treasury is authorized to refund the United States bonded debt in 33-year bonds bearing interest at two per cent. The national banks were authorized to issue circulation notes to the face value of the bonds deposited in the national treasury. The law of 1913 created the Federal reserve banks, which may issue currency in denominations of $5, $10, $20, $50, and $100.

CURRENTS, the movements of oceanic waters with considerable regularity from and to the polar and equatorial regions. They resemble streams or rivers, but are much broader, deeper, and longer. Their temperature is either higher or lower than the waters through which they flow. They are formed on the surface and at great depths, the upper currents usually passing from the equator and the lower currents in an opposite direction. Currents are caused partly through the agency of evaporation, but principally by the variation in the density of the waters, owing to a difference between the temperature of the regions of the equator and those near the poles. The equatorial waters, becoming lighter on account of the warm temperature, rise to the surface and flow both north and south, their place being taken by the denser, colder waters flowing in from the polar regions. In this way a constant interchange of the waters is effected between the equatorial and polar regions, which takes place mostly along the bottom from the poles to the equator and along the surface from the equator to the poles. Owing to a low temperature in frozen seas near the poles, the interchange is larger between the equator and the polar circles. These currents would flow due north and south, if the earth had no rotation on its axis. They are deflected from a direct course between the equator and the polar regions on account of the earth's rotation, the position of the land masses, the winds, and differences in the density and level of the sea caused by evaporation.

The currents of the ocean are of utility in commercial and agricultural enterprises. By means of them the climate of the countries located in high latitudes is modified materially by the warm equatorial currents, while the warmer climates in the tropical regions are pleasantly modified by currents from the polar regions. The speed of vessels has been materially increased in certain directions by entering into their paths. Both the Pacific and Atlantic oceans have great equatorial and polar currents, their courses extending between the equatorial and polar circles. In the Indian Ocean the movements are largely restricted to currents which flow southward, owing to there being no outlet toward the north. The Sargasso Sea is in the North Atlantic Ocean. It is a vast expanse of ocean in which seaweeds float upon the surface, owing to the water being undisturbed by extensive movements. The best examples of currents are the Kuro Sivo, or Japan Current, in the North Pacific, and the Gulf Stream, in the North Atlantic.

CURRY, Jabez Lamar Monroe, statesman and educator, born in Lincoln County, Georgia, June 5, 1825; died in 1903. He was educated at the University of Georgia and the law school of Harvard University and began the practice of law in 1845. The following year he enlisted as a private in the Mexican War, served in the Alabama State Legislature from 1848 to 1855, and supported Buchanan as a candidate for President. In 1857 he was elected a member of Congress, but resigned at the beginning of the Civil War to support the Confederate States. In 1861 he was elected a member of the first Confederate Congress, fought in the Confederate army in 1864-65, and the following year, became president of Howard College, Alabama, serving until 1868, when he became professor of law at Richmond College. He was general agent of the Peabody Educational Fund in 1881-85, and in the latter year was appointed United States minister to Spain by President Cleveland and represented that country at the coronation of Alfonso XIII. He published "The Southern States of the American Union," "History of the Peabody Educational Fund," "Constitutional Government in Spain," and "William Ewart Gladstone, a Study."

CURTIN, Andrew Gregg, public man, born in Bellefonte, Pa., April 22, 1817; died Oct. 7, 1894. He studied in Dickinson College and took up the practice of law. In 1860 he was

elected Governor of Pennsylvania, serving until 1866, and during the time secured a reputation as an efficient war Governor. He was minister to Russia in 1869-72 and subsequently served three consecutive terms as a Democrat in Congress, beginning in 1881.

CURTIS (kûr'tĭs), **Benjamin Robbins,** jurist, born in Watertown, Mass., Nov. 4, 1809; died Sept. 15, 1874. He graduated at Harvard University in 1829, was admitted to the bar, and established a successful law practice in Boston. In 1851 he was appointed an associate judge of the United States Supreme Court, but resigned in 1857, after presenting a dissenting opinion in the Dred Scott decision. He was one of the counsel who defended President Johnson in the impeachment trial before the Senate in 1868. He published a large number of law reports, including "Digest of the Opinions of the Supreme Court of the United States in 1854" and "Decisions of the Supreme Court of the United States."

CURTIS, George Ticknor, lawyer and author, born in Watertown, Mass., Nov. 12, 1812; died in New York City, March 28, 1894. He graduated at Harvard in 1832, was admitted to the bar four years later, practiced law in Boston until 1862, and then located in New York. Previously he had been a member of the Legislature of Massachusetts for four years, beginning in 1840. The famous causes in which he was a counsel include the legal tender cases and the trial of Dred Scott. He published many historical and law books, among them "Life of Daniel Webster," "Constitutional History of the United States," "Law of Copyright," "Equity Precedents," "English and American Admiralty Decisions," "Origin, Formation, and Adoption of the Constitution," and "Life of James Buchanan."

CURTIS, George William, author, born in Providence, R. I., Feb. 24, 1824; died Aug. 31, 1892. He was employed as a clerk in a New York mercantile establishment in 1839 and for some time worked as a farm hand at Concord, Mass. In 1846 he made a tour of Europe and spent four years in travel and study, visiting Syria, Egypt, and many other countries of antiquity. He became editor of the New York *Tribune* after his return, and was associate editor of *Putnam's Monthly* for five years, beginning in 1852, in which enterprise he lost all his earnings, besides those accumulated for the next sixteen years to wipe out the debt. In 1853 he engaged as writer for *Harper's Monthly,* and after ten years became political editor of *Harper's Weekly.* In the latter he published a series of papers called *The Editor's Easy Chair.* Entering politics, he became a polished and accomplished speaker and took part in many of the national political conventions. He was a Republican presidential elector in 1868 and served as chairman of the civil service commission in 1871-73. Being a strong advocate of civil service reform, he left the Republican party and led the Mugwump movement He became regent of the University of New York in 1864 and in 1890 was made its chancellor. Among his published works are "Prue and I," "Nile Notes of a Howadji," "Lotus Eating," and "Howadji in Syria."

CURTIS, William Eleroy, journalist, born in Akron, Ohio, Nov. 5, 1850. In 1871 he graduated at Western Reserve University and the following year accepted a position on the staff of the Chicago *Inter Ocean,* in which capacity he served with eminent success for fifteen years. He became correspondent at Washington for the Chicago *Record* in 1887 and in the meantime held a number of important positions, among them a directorship of the Bureau of American Republics from 1890 to 1893. Though known extensively as a newspaper correspondent and traveler, he has a reputation as the author of many interesting and useful books. His "Yankees of the East" is a popular work describing the manners and customs of the Japanese, and in his "United States and Foreign Powers" is given an able summary of the relations of the United States with other nations. Other publications include "The Capitals of South America," "The Life of Zachariah Chandler," "The True Thomas Jefferson," "The Land of the Nihilist," and "Between the Andes and the Ocean." **He died Oct. 5, 1911.**

CURTIUS (kŏŏr'tsē-ŏŏs), **Ernst,** historian, born in Lübeck, Germany, Sept. 2, 1814; died in Berlin, July 11, 1896. He was educated at Bonn, Göttingen, and Berlin, visited Athens in 1836, and traveled in Greece until 1840. He taught in Berlin, became professor at the university, and served for seven years as tutor to the Crown Prince of Prussia. In 1856 he was chosen professor at Göttingen, but was recalled to Berlin in 1868. His profound learning and close devotion to educational affairs caused his election to a number of societies, including the Royal Academy of Science. In 1875 he secured to Germany the exclusive right to excavate ruins at Olympia for the study of ancient history. Among his many publications are "Greek Sculpture by Springs and Streams," "History of Greece," "The Atlas of Athens," "Classical Studies," "Ancient and Present Times," and "The Peloponnesus."

CURVE, in geometry, a line which continually changes its direction, or a line no part of which is straight. The circumference of a circle is the simplest of all curves. It is defined as a curve, each point of which is equally distant from the center, or one in which each part of the line is equally curved. The measure of curvature is based upon the circle. The circle which would exactly fit any curve at any point is called the circle of curvature at that point, and its radius is designated the radius of curvature. Curves, in modern geometry, are classified according to the degree of equation by

which they are represented. Thus, a straight line is represented by an equation of the first degree and a curve by one of a higher degree.

CURZON (kûr'zŭn), **George Nathaniel,** statesman, born in Derbyshire, England, Jan. 11, 1859. He was educated at Eton and Oxford, traveled extensively in Persia, Siam, Central Asia, and Corea, and received the gold medal of the Royal Geographical Society in 1895. In 1885 he was employed as private secretary to the Marquis of Salisbury and represented Lancashire as a Conservative member of Parliament from 1886 to 1888. He was Under-Secretary of State for India in 1891-92 and for Foreign Affairs in 1895-98, and became Viceroy of India in 1898, being raised to the peerage at the same time. Curzon displayed a progressive disposition and pursued a vigorous policy toward the British interests in the East. Among his published works are "Problems of the Far East," "Russia in Central Asia," and "Persia and the Persian Question." In 1895 he married Mary Victoria Leiter, who died in 1906, and in 1916 he married Mrs. Grace Duggan of Buenos Aires.



LORD CURZON.

CUSCUS, an animal of the phalanger family, native to New Guinea, the northern part of Australia, and the Solomon Islands. It is stoutly built, has a prehensile tail, and is covered with a woolly fur. Several species have been described, including the gray cuscus and the spotted cuscus. These animals are marsupials and are hunted for their flesh and fur by the natives. The spotted cuscus is about three feet long and has a yellowish-white color marked with spots of dark brown.

CUSH (kŭsh), a person mentioned in the Old Testament as the eldest son of Ham (Gen. x., 6, 7, 8). He is regarded the ancestor of the Cushites, who inhabited the land of Cush, which is supposed to refer to Ethiopia, hence Cush is thought to be the ancestor of the negroes. However, some writers think that the Cushites resemble the Egyptians, but it is reasonably certain that the Ethiopian race once extended across the Mediterranean into Babylonia.

CUSHING (kŏŏsh'ĭng), **Caleb,** statesman, born in Salisbury, Mass., Jan. 17, 1800; died Jan. 2, 1879. He graduated at Harvard in 1817, was tutor of mathematics and natural philosophy here until 1819, and, after being admitted to the bar, he began practice in Newburyport. He was elected to the Legislature in 1825, traveled in Europe in 1829-31, and returned to Massachusetts, where he served in the Legislature. In 1843 he was appointed United States commissioner to China, in which position he negotiated a treaty of commercial value to the United States. He returned to Massachusetts and was elected to the Legislature in 1846, in which he ardently advocated the war with Mexico. In 1845 he joined Gen. Zachary Taylor as colonel, served through the Mexican War, and was promoted brigadier general. He was elected to the Legislature of Massachusetts in 1850. Two years later he was appointed associate judge of the supreme court of Massachusetts and was made United States Attorney-General in 1853. He was president of the national Democratic convention in 1860 and supported the faction that nominated John C. Breckenridge for President. During the Civil War he favored the Union. In 1866 he aided in revising and codifying the laws of the United States and two years later went to Colombia on a diplomatic errand. He served as minister to Spain in 1873 and attained success in settling the difficulties arising from the insurrection in Cuba. Among his numerous published works are "Reminiscences of Spain," "Practical Principles of Political Economy," "Life of William H. Harrison," "Growth and Territorial Progress of the United States," and "Historical and Political Review of the Late Revolution in France."

CUSHING, Thomas, statesman, born in Boston, Mass., Mar. 24, 1725; died Feb. 28, 1788. He graduated at Harvard College, was elected to the Massachusetts Assembly, and became a member of the First Continental Congress in 1774. During the discussion preceding the Revolution he was active as a supporter of the American cause and was reëlected to the Second Continental Congress in 1775, but the following year was defeated because he opposed the Declaration of Independence. He was active in the public affairs of Massachusetts throughout the Revolution, serving as judge and lieutenant governor, and in 1788 took part in the convention that ratified the Constitution.

CUSHING, William Barker, naval officer, born at Delafield, Wis., Nov. 4, 1843; died Dec. 17, 1874. He was appointed to the academy at Annapolis in 1857, but resigned in 1861 to enter the naval service at the beginning of the Civil War. In the same year he distinguished himself in taking the first prize secured by the Federal navy, a tobacco schooner. His most notable service was rendered at Plymouth, N. C., where he captured the *Albemarle,* a Confederate ironclad ram, on Oct. 27, 1864. Congress thanked him officially for this service and made him lieutenant commander. In 1872 he was raised to the rank of a commander, after serving in the Pacific and Asiatic squadrons.

CUSHMAN (kŏŏsh'mạn), **Charlotte Saunders,** actress, born at Boston, Mass., July 23, 1816; died Feb. 18, 1876. Her excellent contralto voice secured a position for her in the church choir at Boston when only twelve years

old. Owing to her father's financial failure, her education was secured by the aid of friends. She appeared first in "The Marriage of Figaro" in 1834, but soon after lost her contralto voice. After taking dramatic training, she entered upon the stage in the rôle of *Lady Macbeth*. She appeared on the stage in various plays in New York, Philadelphia, and other large cities of America and Europe. As a Shakespearean reader she took high rank.

CUSHMAN, Pauline, actress and spy, born at New Orleans, June 10, 1833; died Dec. 2, 1893. She was the daughter of a Spanish refugee, became a variety actress in southern cities, and in 1863 was employed as a government spy by the United States to locate southern sympathizers, in which capacity her service was helpful to the Union. Later she was captured by the Confederates, court-martialed, and condemned to be hanged. She was left behind at the evacuation of Shelbyville and rescued by Union soldiers.

CUSTER (kŭs'tĕr), **George Armstrong,** soldier, born at New Rumley, Ohio, Dec. 15, 1839; slain June 25, 1876. He graduated at West Point in 1861 and entered service at once, taking part in the Battle of Bull Run. Later he was appointed captain and aid to Gen. McClellan. In 1863 he became aid to Gen. Pleasanton and was promoted brigadier general. He rendered important service with Gen. Grant in the Wilderness and with Sheridan in the Shenandoah valley, and, after the evacuation of Richmond, he commanded a cavalry division in pursuit of Gen. Lee. After the war he was assigned to the seventh cavalry as lieutenant colonel with the brevet of major. In 1866 he served with Gen. Hancock in an expedition against the Cheyenne and Sioux Indians, and was afterward tried by court-martial for alleged cruelty, after which he was suspended for a year. In 1868 he was restored at the request of Gen. Sheridan.

In 1873 he served in the Yellowstone expedition and the following year explored the Black Hills. Rapid development of the mineral fields of the Black Hills followed his reports of that region and caused troubles with the Sioux Indians, who were then commanded by Sitting Bull. He marched against the Indians in 1876, dividing his expedition into three columns under Generals Gibbon, Crook, and Terry. Custer personally commanded the column under Terry and, upon reaching an encampment of Indians on the Little Big Horn River, divided his men into three bodies. The Indians concentrated their forces upon Custer's division. As he was attempting to ford the stream, they made a fierce charge, in which 3,000 warriors surrounded him and his detachment of 277 troopers, and all were slain. The remains of Gen. Custer were buried at West Point, and a statue was erected to his memory in 1879.

CUSTIS (kŭs'tĭs), **George Washington Parke,** author, born at Mount Airy, Md., April 30, 1781; died in Virginia, Oct. 10, 1857. His grandfather, John P. Custis, was the first husband of Mrs. George Washington. The son was adopted into the family of George Washington, brought up at Mount Vernon, and educated at Saint John's College and at Princeton. He erected Arlington House on an estate of 1,000 acres, near Washington, D. C., which is now the Arlington National Cemetery. His daughter married Gen. Robert E. Lee. He became a noted speaker, produced several paintings of revolutionary battles, and published "Recollections of Washington."

CUSTOMS DUTIES, the taxes levied on imports and exports of commodities. Duties on exports are forbidden by the Constitution of the United States, owing largely to the disadvantage at which the country would be placed by the competition of general commerce, if consumers in foreign countries were required to pay duties to secure American products. The import duties are paid by the importers for the benefit of the government. Customs duties were levied by Greece and Rome. The Venetian government and others supported customhouses during mediaeval ages. The Tariff Union, or *Zollverein,* as it was called, was maintained by the North German States from 1818 until they united and formed the German Empire after the War of 1870-71. The first customhouse was established in London in 1304. Legislation establishing the more modern customs of Great Britain dates from the conflict between the Parliament and the crown in relation to the right of taxation. The term *custom* was derived from the claim made by the crown that it had acquired rights in certain import and export duties by the right of custom. Beginning with 1846, the legislation of Britain has been largely in the interest of free trade, and duties are now levied only on a few articles.

The customs of Canada are collected under the Customs Act of 1907. It provides for three classes of duties known as the British Preferential Tariff, the Intermediate Tax, and the General Tariff. The *British Preferential Tariff* applies to goods as manufactures imported from any British country. On the other hand, the *Intermediate Tariff* applies to imports from any British or other country to which its benefits have been extended, hence is based upon the principle of reciprocity. The *General Tariff* applies to all goods that may not be admitted under either of the other two classes. A *surtax* is levied on imports from the countries which treat imports from Canada less favorably than those from other countries. The customs collected in 1917 amounted to $53,006,546, which is about the annual average.

Alexander Hamilton, who became the first Secretary of the Treasury of the United States, adopted the English system of customs with scarcely any modifications. In 1799 the earliest customhouse was established in New York City.

The net revenues at first were barely sufficient to pay the officers and clerks employed in its management. At present there are about 160 customhouses in the United States. The ten most important are located at New York, Boston, Philadelphia, San Francisco, Chicago, Baltimore, New Orleans, Saint Louis, Detroit, and Tampa. The receipts at New York aggregate about as much annually as those of all others combined. In 1914 the total net receipts were $311,985,647. The fiscal year begins on July 1, according to an act of Congress in 1842, hence the decade from 1841 to 1850 embraces only nine and a half years. Following are the total receipts by decades of the government through the customhouses since the organization of the system:

From 1791 to 1800	$	50,321,485.87
" 1801 to 1810		129,540,517.63
" 1811 to 1820		163,804,167.09
" 1821 to 1830		198,523,207.69
" 1831 to 1840		204,703,913.92
" 1841 to 1850		243,666,681.78
" 1851 to 1860		544,980,470.30
" 1861 to 1870		1,239,458,442.34
" 1871 to 1880		1,663,973,043.74
" 1881 to 1890		1,992,600,748.76
" 1891 to 1900		2,195,396,503.80
" 1901 to 1905		1,300,844,840.00
" 1905 to 1910		1,876,884,492.75
Total	$	11,804,698,515.67

CUTHBERT (kŭth'bĕrt), **Saint,** an English saint of the Middle Ages, born about 635; died March 20, 687. He is recognized as one of the three saints of the English. His early life was that of the shepherd boy. Later he became a monk in the monastery of Melrose and still later superintendent of guests at the monastery of Ripon. His desire for a more austere life even than the monastic caused him to build a hut on Farne Island, in which he became a solitary recluse. A number of eminent men, among them the King of Northumbria, visited him and induced him to accept the bishopric of Hexham. His life was one of much activity and the influence he exercised was effective during his lifetime and still greater after his death. A number of churches were dedicated to him in various parts of Great Britain.

CUTLER, Manasseh, clergyman and botanist, born at Killingly, Conn., May 3, 1742; died at Hamilton, Mass., July 28, 1823. He graduated from Yale in 1765 and was admitted to the bar of Massachusetts two years later. Not finding the practice of law congenial, he secured a degree in theology and began to preach in 1770. He officiated as pastor of the Congregational church at Hamilton until his death. In the Revolutionary War he served as brigadier chaplain and afterward practiced medicine at Hamilton. His studies included botany, in which he described 350 native species of plants found in New England. He became a member of the Ohio Company, an organization founded to secure the location of bounty lands in a body, and which obtained a government grant of 1,500,000 acres of land northwest of the Ohio River. He served in the Legislature of Massachusetts and was a Federalist member of Congress from 1801 until 1805.

CUTLERY (kŭt'lĕr-ȳ), the general name of sharp-cutting and many-pointed instruments, made chiefly of iron, steel, and cast steel. The first cutting instruments that may be classed as cutlery were made of flint and shells, and these were superseded by those in which bronze was used for the cutting blade. At present steel is employed almost exclusively, though the quality differs materially. The best grade of cast steel is used in making the better class of razors, scissors, penknives, and lancets. Knives and forks employed for table use are manufactured largely of shear steel. Cutlery of all kinds is made chiefly by a forging process, either hand or machine forging, the former being employed for small pieces and the latter for the larger articles. After forging, the piece is made true by filing, after which it is tempered, ground, and polished. Heavy cutting instruments, such as axes, are usually made of two kinds of steel, the cutting edge of the finest quality and the thick part of a soft, cheap, grade of steel.

CUTTER (kŭt'tĕr), a small vessel with one mast and fitted with fore and aft sails. Most cutters are built with special reference to speed. They differ from the sloop in having no stay to support the jib and are used by yachtsmen and for revenue cruisers. Large vessels usually carry four or more boats, known as cutters, as a part of the equipment. This class is fitted either for rowing or sailing.

CUTTLEFISH (kŭt't'l-fĭsh), a genus of fish which includes the squid, octopus, nautilus, sepia, and other species of marine animals. They bear the scientific name *Cephalopoda.* The body of the cuttlefish is oblong and depressed, sacklike in form, and provided with two narrow lateral fins extending to the anterior part of the body. It has ten arms, each containing four rows of suckers. An internal shell is lodged in a sack, which is somewhat oval, light, and porous. The eyes are very large, and the long tentacles, furnished with suckers on one side at the extremity, serve as food catchers. When not in use, they are carried in pockets beneath the eyes, and may be thrown out with considerable force and skill in seizing the prey. The skin is whitish in color, dotted with spots of red, and the length of the fish is from eight inches to three feet.

The cuttlefish is provided with a bag containing a deep brown fluid that is thrown out to darken the water in cases of danger. By means of it the animal is able to make an easy escape. On account of this and its great activity, much difficulty is found in catching the animal. In early times this fluid was used in making India ink, but it has been superseded by the product made from lampblack and other substances. From the blade-shaped cuttlebone are made tooth powder, pounce, molds for small

silver castings, polishing powder, and other useful products. It yields medicine useful for stomach and other complaints.

Cuttlefish are found in almost every portion of the sea. They habitate the bottom of the ocean and coast indentations, confining themselves along the shore and in moderately deep water. Their movements are largely by means of two fins through which streams of water are squirted in such a manner as to assist in propulsion. When in search of food, they watch the prey in a motionless position, but when within easy reach dart their tentacles forward with great rapidity and secure the victims. By a process of withdrawing air from the limbs, they are fastened with a viselike rigor to the victim and escape is rendered impossible. Fishermen have found cuttlefish harmful in devouring fish when caught in their nets. Some of the ancients regarded the flesh of the cuttlefish valuable for food. See **Octopus.**

CUVIER (kü-vyā'), **Georges, Baron,** naturalist, born at Montbéliard, France, Aug. 21, 1769; died May 13, 1832. He was the son of a German officer, the place of his birth belonging to Württemberg at that time. He was educated in his native town and entered the Karls Academy at Stuttgart, an institution in which Schiller and other men of eminence were educated. His nomination for the institute was made by Prince Charles of Württemberg. He became a lecturer on natural history and distinguished himself by profound learning, elegance of delivery, and elevated speculation. His investigation of the forests, plants, and fishes led to many new and valuable discoveries. Subsequently he went to Paris, where his lectures were attended by the most accomplished society men and students of advanced branches of learning. He was appointed to the College de France in January, 1800, succeeding Daubenton, and two years later was made perpetual secretary of the Institute. He rose to the height of confidence of the Emperor of France, was admitted to the council of state, and continued to occupy a high place, notwithstanding the fall of Napoleon. In 1818 he was admitted to the French Academy, was made grand officer of the Legion of Honor in 1826, and held many other positions of honor. His lectures and scientific publications include numerous volumes. They include "The Animal Kingdom," "Discourse on the Revolutions of the Surface of the Globe," and "The Natural History of Fishes."

CUYLER (kī'lĕr), **Theodore Ledyard,** clergyman, born in Aurora, N. Y., Jan. 10, 1822; died Feb. 26, 1909. He graduated at Princeton University and Princeton Theological Seminary, and in 1848 was ordained to the ministry. In 1853 he became pastor of the Dutch Reformed Church on Market Street, New York City, and was pastor of the Presbyterian Church in Brooklyn in 1860-90. In the latter year he resigned to become a minister at large and was presented with a purse of $30,000. He was an active worker in the line of temperance and philanthropy. His publications include "God's Light on Dark Clouds," "From the Nile to Norway," "Christianity in the Home," "Help and Good Cheer," "Our Christmas Tides," and "Recollections of a Long Life, an Autobiography."

CUYP (koip), the name of a celebrated Dutch family of painters, including two generations, of whom Albert Cuyp is the most celebrated. He was born at Dort, Holland, in 1605; died in 1691. His works most highly praised include paintings of battle scenes, horse markets, wintry landscapes, and grazing and reposing cattle. Several of his productions have sold at high prices; one of natural scenery was sold in 1844 for $5,300. His father, Jacob Cuyp, was a celebrated painter of portraits, and his nephew, Benjamin Cuyp, ranked high in skill for painting seashore and Bible scenes.

CUZCO (kōōs'kō), a city of Peru, capital of a department of the same name. It is located in a broad valley between the headwaters of the Urubamba and Apurimac rivers, about 11,250 feet above sea level. Railroad connections with the coast and Lake Titicaca make it an important seat of commerce and local industry. The manufactures include cotton and woolen goods, soap, sugar, leather, clothing, machinery, and furniture. It is the seat of a cathedral and a university. Many of the streets are paved with stone and macadam. The public utilities include a public park, electric lighting, waterworks, and a public library. Among the ancient Peruvian cities it held high rank. The Incas emperors occupied it as their capital for many years and beautified it by fortresses and massive architecture, specimens of which still remain. Pizarro conquered it in 1534. Population, 1916, 31,226.

CYAMETER, an instrument for measuring the intensity of the tint of the atmosphere. It was invented by Saussure and consists of a disk divided into sections, each of which is tinted, ranging from white to a deep blue. It is held by the observer in such a position that the color of the sky may be compared with the tints of the instrument, and as the disk is turned it is possible to find a color that corresponds with the blueness of the sky.

CYBELE (sĭb'ĕ-lē), or **Rhea,** a goddess worshiped by the ancient Greeks and Romans. She was the wife of Cronus and mother of Zeus, Poseidon, and Hades, these three constituting the ruling race of gods. In art she was represented seated on a throne, crowned with flowers, and at her side was a lion. Some artists painted her in a chariot drawn by lions. Her worship spread from Crete to Asia Minor, and was introduced in Rome about 204 B. C.

CYCLADES (sĭk'lă-dēz), the southern group of islands in the Aegean Sea, belonging to Greece, so named because they encircle the sacred isle of Delos. They are mountainous

and of volcanic origin, but contain fertile soil. Among the largest islands are Myconus, Andros, Tenos, Paros, Melos, and Naxos. The productions include silk, wine, cereals, live stock, olive oil, and fruits.

CYCLAMEN (sīk'lă-mĕn), a class of plants belonging to the primrose family, native to many parts of Europe and Asia. Two species are cultivated for their flowers in greenhouses. The hardier variety is native to the southern part of Europe and is admired for its flowers, which are either white or rose-colored. The flower has the appearance of being turned inside out, owing to the petals being strongly reflexed.



CYCLAMEN.

CYCLE (sī'k'l), a period of years or time in which particular phenomena or a succession of events take place, beginning again at the end of the cycle to pass through the same course. The cycle of the sun covers a period of twenty-eight years; that is, the days of the month return to the same days of the week. In the calendar the return to their former place is marked by the dominical or Sunday letters. The cycle of the moon includes a period of nineteen years, after the lapse of which time a new and full moon occurs on the same days of the month. From its discoverer, Meton, the latter is sometimes called the Metonic Cycle and the Golden Number.

CYCLING (sī'klĭng), an art developed by the perfection and general use of bicycles. In many centers of population associations are maintained for the purpose of developing the art. It is their aim to promote interest with the view of establishing bicycle riding as a game and for the development of grace and skill in its use. Among the most celebrated organizations founded are the League of American Wheelmen and the National Cycling Association. The best records made by professional riders as to time include the following: One-half mile, 40 seconds; one mile, 57; two miles, 2:30; three miles, 3:52; four miles, 5:21; and five miles, 6:45. When the bicycle first came into use, wheeling was a fad, but now it is employed more specially for business purposes and scientific sports.

CYCLOMETER (sī-klŏm'ĕ-tĕr), an instrument used to record the revolutions of certain parts of machinery, such as the wheel of a carriage or bicycle. It is commonly attached near the wheel of an automobile, in such a position that a cam on the spoke will act upon a projecting part at every revolution, causing the clockwork within the cyclometer to move. The circumference of the wheel being known, it is possible to estimate the distance traveled by computing the revolutions recorded in the instrument. In most forms the mechanism is so arranged that the register will show every five, ten, and one hundred miles, as the case may be, when the instrument will begin anew in registering in these denominations.

CYCLONE (sī'klōn), the name applied to storms that have a circular or rotary movement. The diameter varies from a small extent to 500 miles, the rotary motion being rapidly round a center and the advance movement often reaching forty miles an hour. Cyclones are caused by the rays of the sun falling within the tropics and heating the air so it rapidly ascends, thereby causing colder currents to rush beneath and take its place. The revolving motion is produced partly by the rotation of the earth, but more directly by the rapid inflow of the lower currents of air as the lighter currents ascend. No cyclones are experienced directly under the Equator. Those south of the Equator revolve in a direction the same as that of the hands of a watch, while those north of the Equator revolve in a diametrically opposite direction. Cyclones are most common to the western portions of the United States, the West Indies, the China Seas, and the seas surrounding the Mauritius Islands. The cyclones frequenting the West Indies originate mostly in the Caribbean Sea. This class of storms is extremely destructive, often tearing down forests, destroying cities, and causing great loss of life and property. Skillful navigators are able to escape them by sailing out of their course, or, if struck, they avoid serious damage by a careful and proper adjustment of the sails. The approach of cyclones is marked by a rapid fall of the barometer and is preceded by a singular calm. They are attended frequently by intense electrical disturbances.

CYCLOPEAN (sī-klō-pē'ăn), the name applied to a primitive style of architecture, which is fabled to be the work of the Cyclops. It consists of huge blocks of stone, unhewn and uncemented, and the corners are fitted accurately into one another. Other structures of this kind consist of regular blocks of equal height. Specimens are found in Asia Minor, Sicily, at Mycenae, in Greece, and other regions of the ancient peoples.

CYCLOPS (sī'klŏps), in Greek mythology, a race of giants, sons of Uranus and Ge, meaning Heaven and Earth, slain by Apollo. They worked with Vulcan at his forge in the heart of burning mountains, especially in Mount Aetna.

They are sometimes represented as a race. In the "Odyssey" they are described as a race having only one eye, in the center of the forehead. It is said that they had enormous strength and were fearless of gods and men. Some writers consider them similar to the Volcanic Cyclops in having great strength and one large round eye, but different in that they are connected with Neptune and the forces of the sea. The Cyclops appear to have lived in Sicily and reared large herds of sheep, goats, and cattle. Polyphemus, one of their number, was a son of the sea god. The most distinguished that labored with Vulcan were Brontes, Steropes, and Arges.

CYDNUS (sĭd'nŭs), a river of Asia Minor, in Cilicia, rises in the Taurus Mountains and flows into the Mediterranean Sea. Anciently it was navigable to Tarsus, about twelve miles, but its mouth is now obstructed by bars of sand. The Cydnus is celebrated as the meeting place of the fleets under Antony and Cleopatra in 41 B. C.

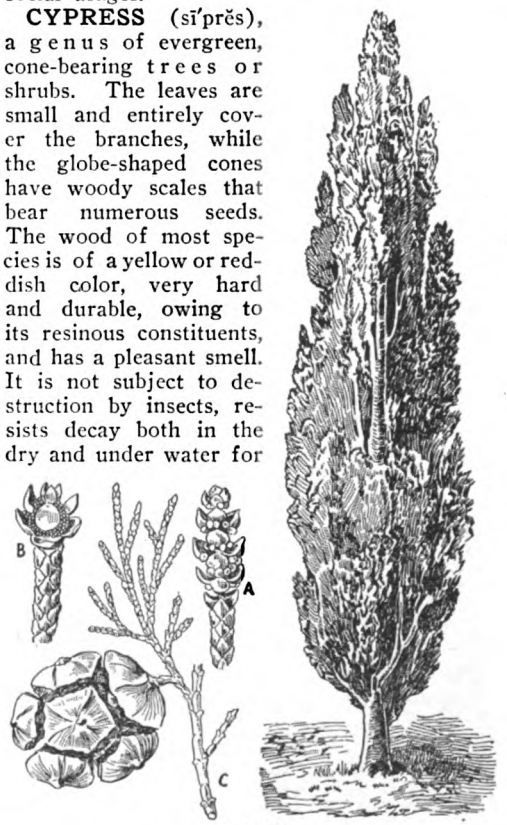
CYLINDER (sĭl'ĭn-dĕr), a solid geometric form consisting of a long, round body, having two flat, circular surfaces which are equal and parallel. Any cylindrical portion of a machine is called a cylinder, especially if hollow and proportioned so the length somewhat exceeds the diameter, as the cylinder of a printing machine, the chamber in which the force of steam, or other power, is exerted on the piston, the barrel of a gun, etc. The axis of a cylinder is the straight line about which it revolves; the bases are the two opposite ends.

CYMBALS (sĭm'bąls), the name of plates of bronze, more or less basin-shaped, to which leather straps are fastened for holding by the hands in producing sounds in accord with music. They were used in very ancient times and are represented upon many monuments. In 1043 B. C. they were mentioned among other instruments in connection with the return of the ark of David. The Grecians used them in worshiping the goddess Cybele. Cymbals now made consist of twenty parts of tin and eighty of copper. The best are imported from China and Turkey. They are used mostly in military music and on the bass drum played in orchestras. One cymbal is fixed to the drum and the other is held in one hand by the player, while the drumsticks are held in the other hand. The best effect is secured by being struck together with a single sliding motion.

CYMRI (kĭm'rĭ), or **Kymry,** a branch of the Celts of Britain. They succeeded the Gauls and drove them west into Ireland, into the Isle of Man, and toward the north into the Highlands of Scotland, while they themselves located in and occupied the southern portion of Britain. Later they were driven out of the Lowlands of Britain into the mountain regions of northwestern England, and into the mountains of Wales by the invasion of the Saxons, Angles, and Jutes. Descendants of the Cymri are found chiefly in Wales at present.

CYNICS (sĭn'iks), the name of a school of Greek philosophers, founded in the fourth century B. C. by Antisthenes, a pupil of Socrates. The seat of this school was in the gymnasium Cynosarges in Athens, and the most renowned disciples included Diogenes, Crates of Thebes, his wife Hipparchia, and Menippus. They taught that all speculative philosophy is detrimental to the real knowledge of truth, that it leads to sophistry and the destruction of human society, and that the true object of philosophy is to show how men might best live morally and peaceably. In this they harmonize with the Stoics, but differed from them in defining virtue to be the highest possible simplicity in living. Their devotion to the simple life was so great that they came to despise labor, decency, cleanliness, and the essential requirements of society. This caused them to become in disrepute. The name *Cynic* is still applied to one who disregards the proprieties of life, doubts the wisdom of protecting personal character or motives, or displays singularity in treating the social usages.

CYPRESS (sī'prĕs), a genus of evergreen, cone-bearing trees or shrubs. The leaves are small and entirely cover the branches, while the globe-shaped cones have woody scales that bear numerous seeds. The wood of most species is of a yellow or reddish color, very hard and durable, owing to its resinous constituents, and has a pleasant smell. It is not subject to destruction by insects, resists decay both in the dry and under water for many years, and is a favorite wood for cabinet work, owing to its beautiful color and property



CYPRESS.

A, male flower; *B,* female flower; *C,* fruit.

of being easily polished. It grows profusely in swamps and often attains a thickness of from ten to twelve feet at the ground. Some species have large spreading tops, while others assume a slender, cone-shaped form. In the United States there are large forests, especially in the south and on the Pacific slope, and some species are common to the far north of Canada and Alaska.

The name was derived from Kypros, the Greek name of the island of Cyprus, where the tree is found in great abundance. It is native to Persia, the Levant, and countries adjacent to the Mediterranean Sea. The Mohammedans planted it largely in burial grounds, which have taken on the form of immense forests. The Romans and Greeks cultivated it in their parks and gardens for ornamental and sanitary purposes. Cypress wood was used largely for coffins by the Greeks and for mummy chests by the Egyptians. The doors of Saint Peter's at Rome were originally made of it. Though subsequently replaced by brazen doors, they answered the purpose for more than a thousand years. The cypress gates of Constantinople served their purpose for an equal length of time. Cypress wood is used largely at present for building purposes in Europe as well as in other portions of the old world.

CYNTHIANA (sĭn-thĭ-ā′nȧ), a city of Kentucky, county seat of Harrison County, thirty-three miles northeast of Lexington, on the Louisville and Nashville Railroad. It is finely located on the south fork of the Licking River, and is surrounded by a fertile farming region. The manufactures include machinery, cigars, and spirituous liquors. It has electric lights and other municipal facilities, several county buildings, and a number of churches and schools. In 1864 it was the scene of a battle between the Confederates under John Morgan and the Federals under General Burbridge, in which the former were defeated. Population, 1910, 3,603.

CYPRIANUS, or Cyprian, Thascius Caecilius, bishop and martyr, born at Carthage, Africa, near the beginning of the third century; died Sept. 14, 258. He was a teacher of rhetoric and was converted to Christianity about 246, and two years later became Bishop of Carthage. Emperor Decius promulgated an imperial decree in 249 by which Christianity was made a forbidden religion, and Cyprianus withdrew to an unknown region in the desert to escape persecution, but returned to Carthage in 251. He assembled a council to determine what should be done with the deserters of the Christian faith, whom he wished treated with leniency and moderation. He wrote a number of treatises and many epistles on ecclesiastical affairs. In 258 he suffered martyrdom under Valerian.

CYPRUS (sī′prŭs), an island in the eastern part of the Mediterranean, south of Asia Minor. It is sixty miles wide and 145 miles long. The area is 3,584 square miles. Two mountain ranges traverse its surface, one along the northeastern coast and the other in the southern part. Both ranges trend east and west. The southern chain is the most prominent, its highest point, Mount Troödos, having an altitude of 6,585 feet above sea level. Numerous bays and inlets indent the coast and furnish safe harbors. A number of small lakes occur in the eastern and southern parts. The Pedioes Potamos is the chief stream. Large areas of the surface are exceedingly fertile and productive. All parts of the island have a pleasant and healthful climate. The mountains are covered with forests of excellent timber and underlaid by rich mineral deposits. The chief minerals include copper and salt, which were produced in large quantities anciently, but are not worked extensively at present. Among the products are cotton, wheat, barley, tobacco, olives, raisins, carobs, and various vegetables. Silk culture is an important industry. The extensive pasture lands facilitate the rearing of large herds of sheep, goats, and cattle. The chief exports consist of raisins, cotton, wool, carobs, cheese, cocoons, and salt. The imports are exceeded greatly by the exports, thus adding annually to the wealth of the island.

The island is divided into the six districts of Kyrenia, Larnaca, Nicosia, Papho, Limasol, and Famagusta. The government is administered by a resident high commissioner with an executive council, and a legislative council of eighteen, of whom twelve are elected by popular vote. Nicosia, population 14,752, is the seat of local government. Other towns include Larnaka, Limasol, and Famagusta. Under British rule a system of schools has been established, supported by public grants. A number of railway lines have been built, including one inland from Famagusta, where a harbor has been improved. A majority of the inhabitants are Greek Catholics and the remainder are mostly Moslems. Population, 1916, 238,312.

Cyprus was colonized by the Phoenicians and later fell successively into the hands of the Greeks, Egyptians, Persians, and Macedonians. It became a Roman province in 57 B. C., and was connected with the eastern division of the empire. The Cypriotes were visited by Saint Paul and were among the first gentile people to embrace Christianity. They were conquered by the Saracens after the decline of Rome began. Richard I. of England conquered them in the third Crusade to Jerusalem and restored the island in 1191 to Guy de Lusignan, but, after his line became extinct, it fell into the hands of the Venetians, in 1489. The Turks conquered it in 1571 and added it to the Ottoman Empire, but it was ceded to Great Britain in 1878 by the convention of Constantinople, with the provision that it should revert to Turkey when Batoum and Kars are restored by Russia. The island is rich in relics of ancient peoples. Among the remains discovered is the oldest

copy of the Gospels and other early Christian writings of much value. Many of the remains may be seen in the museums of London, Berlin, and New York City.

CYRENAICS (sĭr-ē-nā'ĭks), a school of Greek philosophers, founded in 380 B. C. by Aristippus of Cyrenaica, a pupil of Socrates. It taught that pleasure is the highest object in life, that virtue consists in the art of producing the highest possible amount of agreeable feeling, and that all should live in moderate activity, but pains should be shunned. This school agreed with the Cynics in despising all speculative philosophy, but maintained a higher plane of morality and limited their practice to the amiable and moderate enjoyments of life. It was succeeded a century later by the philosophy of Epicurus, known as Epicureanism. The chief philosophers of the Cyrenaic school included Aristippus, the founder, his daughter Arete, his grandson Aristippus Metrodidactus, and Hegesias.

CYRENE (sī-rē'nē), an ancient city of Africa, the capital of Cyrenaica, located about ten miles from the Mediterranean. It was situated on an elevated tract of land about 1,800 feet above the sea giving it a fine outlook over the surrounding country. A colony of Dorians founded it in 631 B. C. and made it a center of Greek learning. It had a large commerce with Greece and Egypt for many centuries. Among its famous men are the astronomer Eratosthenes, the poet Callimachus, and the philosophers Carneades and Aristippus. Grenna, a small town of the province of Barca, now occupies the site.

CYRIL (sĭr'ĭl), **Saint,** Bishop of Jerusalem, born near Jerusalem, about 315; died in 386. He was ordained as priest in 345 by Maximus, Bishop of Jerusalem, whom he afterward succeeded. Extended controversies with the Arians caused him to be deposed in 358, but he was restored to office the following year by a synod held at Seleucia. Subsequently he was deposed a number of times, but each time was exonerated and restored. His writings are largely on doctrinal points in theology, including a number of treatises and addresses.

CYRIL, Saint, a patriarch of the Greek Church, born in Alexandria, Egypt, about 376; died in 444. He studied under Theophilus, Bishop of Alexandria, whom he succeeded in 412. Alexandria was at that time one of the four principal seats of ecclesiastical power and its bishops bore the title of patriarchs. A controversy between him and the Jews caused him to expel them from the city in 416. He opposed the Nestorians and presided at the council of Ephesus in 431, which deposed Nestorius. His writings are very numerous and include a work in ten volumes written against the teachings of Julian the Apostate.

CYRUS, The Great, founder of the Persian Empire, according to Herodotus, the son of a Persian noble named Cambyses. For the greater portion of the history of this remarkable man we have to look to the cuneiform inscriptions found on tablets, cylinders, and monuments. It is generally agreed by historians that he was a man of courage, amiable disposition, and given to plotting ambitious schemes from youth. He early surrounded himself by trustworthy followers and put himself at the head of the Persian troops and advanced into Media, where he overthrew the forces of Astyages in 509 B. C. By adding this dominion to his own, he founded the celebrated Medo-Persian Empire, and spent a number of years in solidifying his dominions. Entering upon a career of conquest, he gained Lydia from the famous Croesus in 546, and soon after subjected the whole of Asia Minor. In 538 he captured the city of Babylon, the celebrated metropolis of Babylonia, by which the Jews were liberated from capitivity and allowed to return to Palestine. His policy toward the conquered people was one of liberality, seeking in this way to reconcile the nations he had captured to his dominion. At the time of his death, which occurred in 529 B. C., his dominions extended from the Gulf of Aden to the Black Sea and from the Mediterranean to the Hindu-Kush Mountains. Both the historians Herodotus and Xenophon give an account of this monarch, which leads to the conclusion that he was wise, gallant, and strong in military achievements.

CYRUS, The Younger, King of Persia, lived about 130 years after Cyrus the Great. He was the second son of the Persian king Darius Nothus. His brother, Artaxerxes Mnemon, succeeded to the throne in 405 B. C. To obtain possession of his brother's kingdom Cyrus organized a conspiracy, but was detected and sentenced to death. Later he was pardoned by the intervention of his mother, Parysatis, and restored to the office of satrap of Asia Minor. While filling this position, he organized a second effort to gain the Persian throne. Gathering an army of 100,000 Asiatics and 13,000 Greeks, he met his brother in battle near Cunaxa in the year 401 B. C., who had an army of 900,000 men. The battle was prolonged and terrific, but resulted in the death of Cyrus. The Grecian contingents distinguished themselves by much bravery, and their return home in the face of superior numbers was celebrated as a national event. It is known in history as the *Retreat of the Ten Thousand,* and was made the subject of Xenophon's most popular work, the "Anabasis."

CZAR (zär), the title of the emperor of all the Russias, probably derived from the Roman title *Caesar.* Ivan IV., the Terrible, was crowned the first Czar of Russia in 1547. *Czarina* is a term used to designate the empress; *czarevitch,* the heir apparent; and *czarevna,* the wife of the heir apparent.

CZECHS (chĕks), the branch of the great

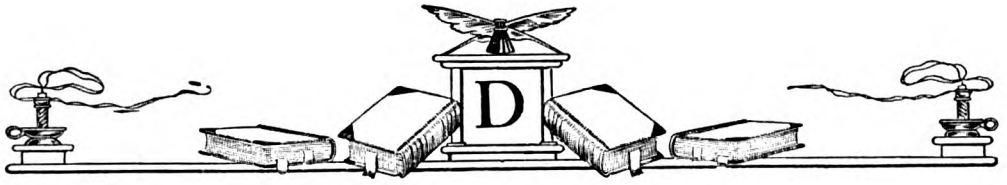
Slavonic family of races now having its chief seat in Bohemia. Nearly all of the Czech people, numbering altogether about 5,900,000, live in Austria. About half of these people are in Bohemia. They migrated from Carpathia, on the upper Vistula, about 451-495 A. D., and settled in Bohemia. The Czech language has an alphabet of forty-two characters. It is of great antiquity and is noted for its high culture. Its grammatical construction is complex. The language is highly inflectional, admitting of many inceptives, frequentatives, derivatives, and diminutives. As a musical language the Czech is classed next to the Italian.

CZERNOWITZ (chĕr'nō-vĭts), the capital of Bukowina, a crown land of Austria, on the Pruth River, about 136 miles southeast of Lemburg. It is the seat of a Greek Catholic cathedral, several synagogues, and a number of noted monuments. The university, founded in 1875, has sixty-two professors and lecturers, an excellent library, and is attended by 850 students. It has a public library of 60,500 volumes. The city is connected by railroads and has modern municipal facilities. Among the manufactures are carriages, clocks, silver plate, toys, cigars, implements, and machinery. It was annexed to Austria in 1777. The Russians captured it in 1915, but they were expelled by an Austro-German army. Population, 1914, 88,772.

CZERNY (chĕr'nē), **George,** known as *Black George,* a Servian leader for independence, born Dec. 21, 1766; slain July 27, 1817. He was the son of Servian peasants, and was forced to flee to Austria on account of having engaged in quarrels with the Turks. Subsequently he joined the Austrian army and fought against the Turks from 1788 to 1791, rising to the rank of sergeant. He returned to Servia and lived on a farm for some years, but, when a band of Janizaries broke into his house in 1801, he again fled for safety, but vowed vengeance. Soon after he organized a band of malcontents and conducted a guerrilla warfare. Owing to dissatisfaction with Turkish rule, his numbers were soon increased and he was able to capture Shabatz. In 1806 he defeated the Turks at the Drina and Morava rivers, and by the secret assistance of Russia captured Belgrade in the fall of the same year. A treaty was made at Slobosic on July 8, 1808, after which he was elected governor by the people and recognized by the Sultan as prince of Servia. Russia was compelled to withdraw aid from him in 1812, owing to the French invasion of that country, which resulted in Turkish success, and he fled to Russia, but soon after settled in Austria. A rebellion in July, 1817, led by Milosch Obrenowitch, resulted in the freedom of Servia, after which Czerny returned, but was murdered at the instigation of Prince Milosch, who was jealous of the popularity of the former chief.

CZERNY, Karl, pianist and composer, born in Vienna, Austria, Feb. 21, 1791; died in 1857. He studied music under his father and began to play in public at an early age. Subsequently he received training under Beethoven, whose celebrated concertos were played by him at the age of fifteen years. He became the most popular teacher of the piano in Vienna, and was the instructor of Liszt and Thalberg. His compositions number about 900. He is the author of several valuable exercises and instruction books for the pianoforte.

CZOLGOSZ (chōl'gŏsh), **Leon,** anarchist and assassin, born at Detroit, Mich., in 1873; executed Oct. 29, 1901. He descended from Polish parents and learned the trade of an iron-worker. In 1901 he attended the Pan-American Exposition at Buffalo, N. Y., for the purpose of assassinating William McKinley, President of the United States, whom he shot twice on Sept. 6, 1901, the martyred President dying eight days later. He was tried in the State supreme court at Buffalo, N. Y., and on Sept. 24, 1901, was convicted of murder in the first degree. The defendant introduced no witnesses in his behalf, but an address was made for the prisoner by ex-Judge Lewis. The assassin was executed by electricity in the State Prison at Auburn, N. Y.

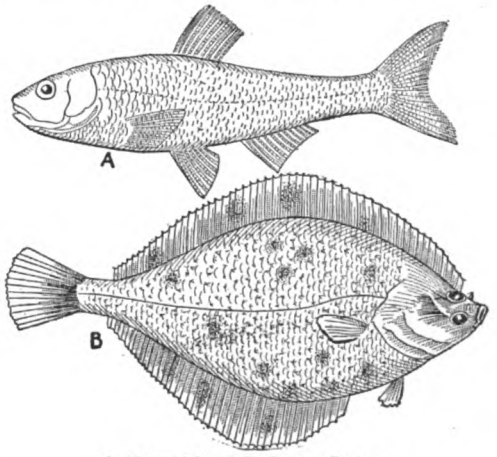


D, the third consonant and fourth letter of the alphabet. The name in the Greek is *delta,* which is a modification of the Semitic word *daleth,* meaning a door. It is interchangeable with *t* in some languages, since the two letters are similar in the mode of pronunciation. In English it is always sounded, though often but slightly, as in handkerchief. It represents a dental sound formed by passing vocalized breath into the mouth, after placing the tip of the tongue against the roots of the front teeth. In Roman numerals D represents 500 and is equal to 5,000 when a line is placed over it, as $\overline{D}$. As a symbol in music D is the second note of the natural scale of C.

DAB, a species of flatfish belonging to the same genus as the plaice and flounder. It is allied to the soles, turbots, and halibuts. The length seldom exceeds twelve inches. The color is brown and yellow and it is characterized by a small mouth and eyes. It is common off the coasts of England and France. A similar fish, the *rusty dab,* is found on the coast of Nova Scotia and New England.

DACCA (dăk'kà), a city of Bengal, capital of a district of the same name, on the Burhi Ganga, 150 miles northeast of Calcutta. The streets are narrow and angular and the older portion is not well improved. In the newer parts a number of fine buildings are maintained. Besides numerous schools, there are several colleges and mosques and places of worship belonging to the Greeks and Armenians. Railroad connections have been established with many commercial centers. Its navigation trade is large, especially in textiles and live stock, owing to its favorable location and safe harbor. It has numerous modern facilities, including tramways, electric lights, and telegraph and telephone lines. It became the seat of the Mohammedans in Bengal in 1610, and with a short intermission remained its capital until 1704. Large manufactures of muslins were carried on in the city by the Dutch and French in the 18th century, when it had a population of about 200,000. Owing to civil disturbances and other causes, it declined for some time, but in recent years its prosperity has been revived. Population, 1916, 92,342.

DACE (dās), or **Dare,** a fish common to the streams of Europe and New England. The various species are fine anglers and favorites for table use. They are gregarious and swim in shoals. Their weight seldom exceeds a pound. The dace spawns in April and May. Artificial



A, Horned Dab; *B,* Brown Dace.

pearls are made of the scales of several species, especially of the roach. Several species, such as the chubs, are favorite fishes in the streams and lakes of the Rocky Mountains.

DACIA (dā'shă-à), an ancient country of Europe, located between the Danube and the Carpathian Mountains. It was occupied by the Daci, a warlike people, and was annexed to Rome by Emperor Trajan in 101 A. D., after a decisive battle near Torda. The Romans sent colonists into the country, constructed highways, and built a great bridge across the Danube. In 274, in the reign of Aurelian, the Romans relinquished Dacia and it was occupied by the Goths. At present the region is comprised in Moldavia, Transylvania, Wallachia, and the eastern part of Hungary.

DAEDALUS (dĕd'à-lŭs), in Greek fable, an Athenian who personified architecture, sculpture, and mechanism. He was the first to introduce the art of sculpture in its higher development as well as architecture of rare beauty, but

great as his genius was also his vanity. His nephew and pupil, Talus, invented both the saw and compass, which caused envy to such an extent that Daedalus slew him, on account of which he fled to Crete for safety. While at Crete he constructed the celebrated labyrinth for King Minus in which he confined the Minotaur, a monster with the head and shoulders of a bull and the body of a man. He was long kept a prisoner, and in order to escape made wings for himself and his young son Icarus. The son was exceedingly delighted with his flight and soared so near the sun that the wax by which his wings were attached melted and he fell into the sea and was drowned. The bereaved father buried his body on an island in the Icarian Sea, named on his account. Later he dedicated his wings to Apollo, and occupied himself on the island of Sicily in the construction of various beautiful works of art.

DAFFODIL (dăf'fō-dĭl), a group of plants of the genus *Narcissus*. Though native to Europe, many species have been widely acclimated and are grown in gardens in America. Most of the cultivated plants bear solitary flowers with a bell-shaped crown longer than the perianth tube. The flowers are mostly yellow and include both single and double forms.

DAGOBERT (dăg'o-bĕrt), the name of several Merovingian kings of France. Dagobert I., born about 600; died Jan. 19, 638, is the most famous of the family. He was elected King of Austrasia in 622. In 628 he succeeded his father as King of Neustria. He added Aquitania to his kingdom in 631, after the death of his brother Charibert. Having been made the ruler of the whole of France, he encouraged interior improvements and greatly restricted the power of the feudal lords and prelates. The most valuable of his public acts was the revision and codification of the Frankish laws, which became known as the Salic and Riparian laws. His two sons, Sigebert and Clovis II., were placed on the thrones of Austrasia and Neustria when mere children. Dagobert II. (652-679), son of Sigebert II., was the last Merovingian King of Austrasia.

DAGON (dā'gŏn), the god of the Philistines, the personification of reproduction, generally represented as half man and half fish. The Old Testament mentions temples built to his honor at Gaza and Ashdod, which were destroyed by Judas Maccabaeus about the year 148 B. C. The great temple at Gaza was the scene of a magnificent sacrifice offered by the Philistines when Samson was delivered into their hands, and at that time the edifice was destroyed by him. An account of this event is given in Judges xvi., 23-30. Doré made it the subject of a famous painting.

DAGUERRE (dä-gâr'), **Louis Jacques Mandé,** painter and physicist, born at Corneilles, France, in 1789; died near Paris, July 12, 1851. His first occupation was that of a revenue officer, but later he took lessons as a scene painter for the opera. His attention was called in 1814 by Nicéphore Niepce to the subject of photographic pictures on metals. The two joined in experimenting for fifteen years with an alloyed process, in which a plate coated with asphaltum was exposed in a camera and the image developed by dissolving away the unalloyed portions by oil of lavender. Most of the work done by Daguerre, who perfected the process, which has since been called Daguerreotype, in 1833. The French government granted a pension of $1,200 to Daguerre, one-half of which was to revert to his widow, and a pension of $800 to the son of Niepce. Other processes have superseded the Daguerreotype.

DAHLGREN (dăl'grĕn), **John Adolph,** naval officer and inventor, born in Philadelphia, Pa., Nov. 13, 1809; died at Washington, D. C., July 12, 1870. He was the son of Ulrick Dahlgren, a merchant of Philadelphia, who served as consul to Sweden for many years. The young man entered the navy in 1826, six years later passed midshipman, and afterward served on the coast survey. He was assigned to ordnance duty in Washington in 1845, in which position he turned a part of his time to inventions. The most important is known as the *Dahlgren gun*, which is an improvement in that it contains relatively more metal behind the trunnions, where the greatest strain is in firing. These guns are unsurpassed in the world and are still favorites among American seamen. At the beginning of the Civil War he was placed in command of the navy yards at Washington, and in 1863 took charge of the South Atlantic blockading squadron as rear admiral. He rendered valuable service in assisting General Sherman in his military operations in South Carolina and Georgia. In 1866 he commanded the South Pacific squadron and in 1868 took charge of the bureau of ordnance in Washington. He wrote a number of works on ordnance that have been used as text-books by the government. Among his writings are "Percussion System," "Boat Armament," "Shells and Shell-Guns," and "Maritime International Laws."

DAHLGREN, Madeline Vinton, writer and society woman, born in Gallipolis, Ohio, in 1835; died in Washington, D. C., May 28, 1898. After securing her education, she wrote sketches and poems under the name of *Corinne* and later under the name of *Cornelia*. She married David Convers Goddard at an early age, who died in August, 1865, and later married Admiral Dahlgren. She was prominent as an opponent of the woman suffrage movement, became one of the founders of the Literary Society of Washington, and served as president of the Ladies' Catholic Missionary Society for a number of years. Among her best known writings are "Thoughts on Female Suffrage," "Memoirs of John A. Dahlgren," "Lost Name," "Lights and Shadows of Life," "South Sea Sketches,"

and "Social Official Etiquette of the United States." She translated a number of works from the French, including Montalembert's "Pius IX." and De Chambrun's "Executive Powers." We are indebted to her for translations from the Spanish, including Cortes's "Catholicism, Liberalism, and Socialism."

DAHLIA (däl'yà), a genus of plants native to Mexico, named after the Swedish botanist Dahl. The plant has been greatly improved and its flowers variegated in color by cultivation. Specimens were first brought to Europe in 1784, but it is now known almost world-wide. The flowers are general favorites in gardens and parks, where the dahlia is cultivated as an ornamental plant. Some species have single flowers, but most of them are double, showy, and



DAHLIAS.

symmetrical. They are propagated by cuttings, seeds, and the roots, which are dug up in the fall and stored like potatoes in the cellar. The corolla of the dahlia yields a beautiful carmine.

DAHN (dän), **Julius Sophus Felix,** author and jurist, born in Hamburg, Germany, Feb. 9, 1834. At an early age he received a classical training, studied history and law in Munich and Berlin, and was made professor of law at the University of Munich in 1862. Subsequently he taught jurisprudence in Würzburg, Königsberg, and Breslau, in which he established a reputation as teacher and writer. Though most of his writings deal purely with history, he is the author of several widely known historical novels, which treat of the primitive Germanic peoples and trace the more important events from the beginning of historic times to the Crusades, and from the Vikings to the Goths in Italy. A volume entitled "Poems, Ballads, and Songs" is a collection of poetry, and his shorter stories include "Attila," "Felicitas," and "Stilicho." Other works written by him include "Kings of the Germans," "Sense in Jurisprudence." "A Campaign to Capture Rome," and "Primitive History of the Germanic and Roman Peoples." He died Jan. 3, 1912.

DAHOMEY (dä-hō'mā), a French colony in Africa, on the northern coast of the Gulf of Guinea, located between Nigeria and the German colony of Togoland. It has been the seat of some contention on account of conflicting claims of France, Germany, and England. The area is about 60,000 square miles and it has a seacoast of seventy miles. It consists of two divisions, a native kingdom under the rule of a local African prince and a colony comprising the settlement of Benin on the coast, with a tract of country extending toward the interior.

The colony is governed by a local governor, who is assisted by a council. Two prominent residents, one of whom is native and one is white, are included with the higher officials. The capital is Abomey, near the port of Whydah, and it and Kotonu are the principal trading points, though considerable commerce is carried on at Grand Popo and at Porto Novo. The natives of Dahomey are Negroes, who are small of stature, but robust, and quite industrious. They engage in fetish worship. Their chief sacrifices are made to trees, snakes, thunder, and the sea. Agriculture, trading, hunting, and rude manufacture are their chief occupations.

The colony has a large area of fertile soil, is well watered by small streams, and is valuable for its coast line on the Gulf of Guinea. Large desert tracts extend throughout the northern part. The wild animals include lion, tiger, boa, hyena, elephant, and many species of reptiles and birds. Among the chief products are tobacco, cotton, indigo, sugar, palm oil, India rubber, millet, vegetables, and many varieties of fruits. The annual exports have steadily increased the past decade. The export of palm oil aggregates about 10,000 tons annually and of palm kernels about 20,000 tons.

Dahomey was organized into a native kingdom at the beginning of the 18th century, but reached its greatest strength under the reign of King Ghezo from 1818 to 1858. It was placed under the protectorate of Portugal in October, 1885, but fell to the French on account of local differences in 1892. A consistent development has been made under French influence. The slave trade has been abolished and the former custom of offering human sacrifices is almost extinguished. Population, 1918, 998,500.

DAIRYING (dā'rȳ-ing), the industry in which milk and butter are produced. This branch of agricultural industry has been greatly extended and radical changes in methods of work have been brought about. The improvements are notable not only in the United States and Canada, but in the dairying districts of Germany, Austria, Denmark, Holland, Belgium, and Sweden, where experimental stations and dairying schools are maintained for the investigation and study of rearing cattle and making

butter and cheese. Denmark maintains about a hundred high schools and a dozen agricultural institutes in which pupils learn dairying by practical work, and, as a result, the industry has been placed on a very high basis. About fifty institutions teach dairying and related productive arts in the United States, where the annual output of butter has a value of $115,500,000 and cheese $32,000,000. About 10,000 creameries and cheese factories are operated. The leading dairy schools of Canada are at Guelph and Toronto. Coöperation has been applied more successfully in dairying than in any other branch of industry. Many farmers have introduced coöperation in various places, uniting the milk products of the farms and sharing the results obtained at a central creamery. The effect has been that butter of a much higher quality is now obtained, the price of the product has been raised, and the quantity has been increased notably.

Much attention is given by agriculturists to the improvement of cattle for dairying purposes. As distinct butter producers the Jersey and Guernsey cattle have been found preferable, since their milk contains the best and largest quantity of butter fat and the flavor is of a high quality. The Holstein-Friesian cattle yield the largest quantity of milk, but their product is inferior in solid material, though they possess a high degree of beef-producing qualities. The Ayrshire cattle are midway between the Jersey and Guernsey on the one hand and the Holstein-Friesian on the other in the quality of milk produced, and have been found excellent for cross breeding with other stock on account of their rugged constitution. An average cow produces about 130 pounds of butter per year, while the higher grades of cattle produce from 300 to 350 pounds, but some individuals yield larger quantities.

The apparatus used in dairying has undergone marked improvements. The Babcock milk-tester, a centrifugal machine for separating cream in small tubes, formerly tested to about one-tenth of one per cent., but it has been so improved and modified that it is capable of testing to one-hundredth of one per cent. It is now used largely among dairymen for testing cattle by their milk product. Equally beneficial improvements have been made in machines for mechanical separation. There are now more than a dozen separators on the market, by which butter fat to within one-tenth of one per cent. can be extracted from the milk. Churns and machinery for working the butter have been improved correspondingly. Another improvement is in *Pasteurizing* cream, which is done by subjecting it to a temperature of 140° to 155° Fahr. Pasteurized cream contains forty to fifty per cent. of butter fat, is considered highly valuable for hygienic reasons, and retails for about forty cents per quart, thus rendering better profit than the butter.

The butter sold on the market is much better and more wholesome than that formerly produced. There are, of course, some exceptions, but as a rule it is much cleaner, more healthful, and pleasanter to the taste. Many of the improvements in manufacturing and in the quality of butter and cheese are due to legislation. The dairying enterprise as a whole has been benefited through the efforts of commissions, which have investigated the industry in foreign countries and utilized the more important discoveries in building up the enterprise in America. See **Creamery.**

DAISY (dā′zy), the common name of the well-known flowers and plants of the species *Bellis perennis.* It is widely distributed, being common to nearly all inhabited countries. The name was derived from its tendency to flower almost continually and means the *day's eye.* It was the emblem of fidelity in love in the age of chivalry. The common daisy of Europe has



DAISY.
Oxeye Daisy; Common Daisy.

been greatly improved and is the plant which is cultivated most extensively in gardens. It includes both single and double flowering species and nearly all shades of colors. The *Oxeye daisy* is a species of chrysanthemum.

DAKOTA (dȧ-kō′tȧ), a family of Indians native to the vast regions between the Mississippi and the Rocky Mountains. It includes among others the Winnebagoes, Sioux, Omahas, Iowas, Poncas, Kansas, Crows, Otoes, Missouris, Assiniboins, and Minnetarees. The Dakotas seem to have come eastward from the Pacific until they met the Algonquins. The language shows some similarity to the Mongolian, perhaps more than that of any other Indian language. The total number of Dakotas now aggregates about 60,000. Some writers use the name interchangeably with Sioux, since they consider the Siouan stock the predominating influence.

DAKOTA RIVER. See **James River.**

DALE, Sir Thomas, Governor of Virginia, died near Bantam, East Indies, in 1619. He was knighted by King James in 1606 and three years later was sent to Virginia as Governor, where he administered the government on the basis of martial law. He planted new settlements near the falls of the James River, now Richmond, conquered the Appomattox Indians, and was succeeded as Governor by Sir Thomas Gates in 1611. When the latter returned to England in 1614, Dale again assumed the chief command. He returned to England in 1616 and in 1619 was made commander of the East India fleet. His laws in Virginia are known as *Dale's Code.*

D'ALEMBERT (dȧ-läN-bâr'), the assumed name of Jean le Rond, mathematician and philosopher, born in Paris, France, in 1717; died Oct. 29, 1783. He was the son of poor parents who left him as an infant on the steps of the chapel of Saint Jean le Rond, from which he was named. In 1729 he was placed in the Collège Mazarin, where he studied physics, astronomy, and mathematics. Later he took a course in law and was admitted to the bar, but gave his attention chiefly to mathematics and philosophy. In 1751 he joined Diderot in editing the Encyclopédie, the great French work of reference, but withdrew from the editorship in 1758. Frederick II. of Germany offered him the presidency of the Berlin Academy and Catherine II. of Russia proposed that he become the tutor to her son, but he declined both offers and continued to reside in Paris. In 1755 he was admitted to the Institute of Bologna on the recommendation of Benedict XIV. His writings include a valuable treatise on fluids and one on dynamics. Among his chief works are "Memoirs of the Berlin Academy," "Treatise on Dynamics," and "Researches Concerning the Integral Calculus."

DALHOUSIE (dăl-hou'zĭ), **James Andrew Broun Ramsey,** statesman, born in Midlothian, Scotland, April 22, 1812; died Dec. 19, 1860. He was educated at Harrow and Oxford, succeeded to the title of Lord Ramsey by the death of his elder brother, and entered the House of Lords at the death of his father in 1838. Owing to his distinguished ability as a member of Parliament, he held many offices of honor and importance and in 1847 was appointed Governor General of India. His administration was no less marked by efficiency than that shown in Parliament, and he became known as one of the most successful and distinguished of Indian proconsuls. Besides effecting reforms, constructing telegraph lines, highways, railroads, and canals, he added Berar, Punjab, Oudh, Pegu, and other districts to the British possessions.

DALLAS (dăl'lăs), a city of Texas, county seat of Dallas County, on the Trinity River, near the mouth of the West Fork. It is on the Missouri, Kansas and Texas, the Southern Pacific, the Texas and Pacific, the Texas and New Orleans, and other railroads. Lines of electric railways connect it with Fort Worth and other cities. The chief buildings include the county courthouse, the post office, the Carnegie Public Library, the Protestant Episcopal Cathedral of Saint Matthew, the Roman Catholic Pro-Cathedral, and a number of fine public schools. It has a fine Confederate monument. Oak Cliff and City Park are notable public grounds.

Dallas is surrounded by a productive farming country and has extensive wholesaling interests. The industries include iron factories, flouring mills, cigar and candy factories, cotton gins, grain elevators, machine shops, and farm implement manufactories. Many of the streets are substantially paved. It has gas and electric lights, waterworks, sewerage, and an extensive electric railway system. The first settlement was made in 1841. Population, 1910, 92,104.

DALLAS, Alexander James, author and statesman, born on the island of Jamaica, June 21, 1759; died Jan. 14, 1817. He descended from Scotch parents and studied in Edinburgh and Westminster, and removed to Philadelphia, Pa., in 1783. Two years later he was admitted to the bar and began a successful practice. President Madison made him Secretary of the Treasury in 1814, in which capacity he recommended the United States Bank authorized by Congress in 1816. He published a number of valuable reports and a work entitled "Exposition of the Causes and Character of the War of 1812-15."

DALLAS, George Mifflin, statesman, born in Philadelphia, Pa., July 10, 1792; died Dec. 31, 1864. He graduated from Princeton College, studied law with his father, Alexander James Dallas (1759-1817), and secured admission to the bar in 1813. His public career began as a private secretary to Albert Gallatin, who went to Saint Petersburg to negotiate a treaty with Great Britain through the Russian emperor. After returning to the United States, he engaged in the practice of law, became mayor of Philadelphia in 1828, and later was chosen United States district attorney. He was elected to the United States Senate in 1831, appointed minister to Russia in 1837, and elected Vice President as a Democrat in 1844. He served as minister to England in 1856, in which position he displayed much ability in relation to the questions pertaining to Central America.

DALLES (dălz), the name applied to various cataracts in the United States. The Dalles of the Saint Louis are cataracts located near Duluth, Minn. The Dalles of the Columbia are near Dalles City, Ore., on the Columbia River, about 200 miles from its mouth and fifty miles above the Cascades. Here the river is compressed by basaltic rocks to about one-third of its usual breadth, with lofty walls on both sides. The chasm formed in this way is fifty-eight

yards wide, and through it the waters plunge in the form of a roaring torrent. The Dalles of the Wisconsin, near Kilbourne City, Wis., is about seven miles long and sixty feet wide. On both sides of the gorge are walls of Potsdam sandstone fully 100 feet high.

DALLES, The, or **Dalles City,** a city of Oregon, county seat of Wasco County, at the head of navigation on the Columbia River, eighty-eight miles east of Portland. It is on the line of the Oregon Railroad and Navigation Company. The chief buildings include the high school, the county courthouse, and a number of churches. It has a large trade in grain, fruit, and live stock. The manufactures include flour, woolen products, clothing, and machinery. In the vicinity and down the river is much beautiful natural scenery. A military post was established at The Dalles in 1838 and the place was incorporated in 1858. Population, 1910, 4,880.

DALMATIA (dăl-mā'shĭ-ā), a province of Austria, extending along the Mediterranean, and bounded by Croatia, Montenegro, Bosnia, Herzegovina, and the Adriatic Sea. The area is 4,940 square miles. It contains ranges of the Dinaric Alps, a large number of coast inlets, and numerous small lakes and rivers. The greatest elevation is reached by Mount Orien, which rises 6,230 feet above the sea level. A large per cent. of the soil is fertile and is farmed, pastured, or occupied by forests. The mountain districts yield minerals, though mining is not highly developed. Among the chief products are cereals, fruits, domestic animals, cheese, silk, and vegetables. Though the least developed of Austrian dependencies, it has considerable shipbuilding. The people along the coast are largely seafaring and engaged in fisheries. A number of thriving cities are located on the Adriatic, where the chief centers of manufactures and commerce are situated. Several railway lines connect them with the interior districts.

The province was once an independent kingdom of considerable strength. It was conquered by the Romans in the reign of Augustus. Afterward it was overrun by the Goths and conquered successively by the Slavonians, Venetians, French, and Italians. Since 1814 it has been a part of Austria, with the title of kingdom. The inhabitants consist mostly of Dalmatian Slavs, who resemble the Croats, and they are the modern representatives of the ancient Illyrians. Other elements include Germans, Italians, and Jews. Population, 1906, 598,764; in 1910, 646,062.

DALTON (dal'tŭn), **John,** chemist and philosopher, born in Cumberland, England, Sept. 5, 1766; died July 27, 1844. He studied in Eaglesfield and Kendal, after which he devoted his attention to mathematics and physical sciences and became teacher at Manchester. Beginning in 1804, he delivered lectures on chemistry in several large cities and soon after published his "New System of Chemical Philosophy." His discoveries relate largely to the constitution of mixed gases, the expansion of gases by heat, the force of steam, and the elasticity of vapors. In chemistry he announced the atomic theory, by which his reputation rapidly spread. Viewed as a discoverer, lecturer, and scientific writer, he ranks among the most noted learned men of England.

DALTON, county seat of Whitfield County, Georgia, 100 miles **west of** Atlanta, on the Southern and other **railroads. The** surrounding country has iron and **limestone** deposits. It has machine shops, cotton mills, and other industries. The chief buildings include the city hall, courthouse, high school, and federal building. It was settled and incorporated in 1848. Population, 1910, 5,324.

DALY (dā'lĭ), **John Augustin,** playwright, born in Plymouth, N. C., July 20, 1838; died in Paris, France, June 7, 1899. His career began as a dramatic writer for several newspapers of New York, among them the *Courier, Express, Citizen, Sun,* and *Times.* Among the productions adapted by him to the stage of this theater are "An Arabian Night," "The Merry Wives of Windsor," "The Merchant of Venice," "The Taming of the Shrew," and other Shakespearean plays.

DALZELL (dăl-zĕl'), **John,** public man, born in New York City, April 19, 1845. At the age of two years he was taken to Pittsburg, Pa., where he attended the public schools, and in 1865 graduated from Yale University. Two years later he was admitted to the bar and established a successful practice. In 1886 he was elected to Congress as a Republican and served in that body more than twenty years. He rose to prominence as a leader of his party, and, as a member of important committees, exercised a wide influence in national legislation.

DAM, a bank or structure to confine the flow of a stream in order to raise its level. Dams are usually built of stone, earth, or wood, though in recent times cement, steel, and cast iron have been utilized to a large extent. Those constructed in ancient times were largely for protection against overflows from rivers, or for safeguards against waves and tides on lakes and seas. Among the most important modern dams of this class are the great dikes of Holland and the levees in the lower course of the Mississippi. The former protect the lowlands against overflows from the sea, while the latter provide safety against general overflows during excessively rainy seasons. Many dams are maintained in streams to obtain power for machinery. In this class the water is raised sufficiently to permit currents to pass rapidly through artificial channels parallel to the main bed of the stream, thus obtaining a permanent flow of water where the force is applied. Another class of dams built which are extensively used includes those constructed to provide water for cities and for irrigation purposes. The New Croton dam, on the Croton River, was

constructed to provide an immense storage reservoir for the water supply of New York City. It is 290 feet high and 216 feet thick at the base, and the solid masonry is 700 feet long, besides which an earthen dam lined with a wall of masonry is extended to a length of 1,500 feet. The structure forms a reservoir eighteen miles long with a capacity of 32,000,000,000 gallons of water, the cost being about $4,250,000.

A dam for irrigation purposes at San Diego, Cal., is 130 feet high and 545 feet long. It is constructed largely of steel and is protected from rusting by paints made of semiliquid asphalt. The capacity of the reservoir is 14,000,000,000 gallons. A dam almost entirely of steel is located near Ash Fork, Ariz., which has a capacity of 36,000,000 gallons. One of the notable dams is located on the South Platte River, Col., forming a reservoir for the water supply of Denver. The greatest height is 210 feet, but its site in a rocky gorge made it necessary to build it only twenty-five feet long at the base and 500 feet at the top. It is constructed of granite blocks, with an inner lining of steel plates, and is supported by steel beams. The reservoir is 200 feet deep at the dam, 150 feet three miles up the river, and fifty feet six miles above the dam. It has a storage capacity of 35,000,000,000 gallons of water. The Roosevelt dam, across the Salt River, seventy-two miles above Phoenix, Ariz., is of the arched gravity type and is 284 feet high. The dam across the Mississippi at Keokuk, Iowa, is a notable power-dam.



Dam at Saint Anthony Falls, Minneapolis, to furnish power for large mills.

The largest dam in the world is maintained by the Egyptian government across the Nile at the Assuan cataracts. The length of this remarkable structure is 6,400 feet, the width is eighty feet at the bottom and twenty-three feet at the top, and the height is ninety-two feet. It is constructed of granite masonry, its foundation being solid granite rock. It serves the purpose of collecting a supply of water from the Nile between November and April for the purpose of irrigating the land farther north during the months of May, June, and July. In the dry season the water is conducted by canals to the different cultivated fields. Through the agency of this improvement vast regions of arid land have been redeemed and made productive. The capacity of the reservoir is about 280,000,000,000 gallons. It is estimated that the entire cost of this dam, including locks and accessories, was $8,750,000.

DAMAGES, in law, the amount of money a person may recover for the injury done by another to his person, property, or other rights. If damage is done through neglect or by a willful act, the party injured may recover in money the amount of the loss, and, if the damage results from a malicious act, the amount recovered may be larger than the actual loss. The courts of England and America generally agree that the person damaged may recover to make good the loss sustained, which is estimated in money, and in addition the defendant is required to pay the court expenses. When the damage results from causes over which no one has control, such as a storm or earthquake, or if it is chargeable to an accident for which no one is to blame, such as a horse running away, the injured party cannot recover.

DAMARALAND (dȧ-mä'-rȧ-lănd), the northern portion of German Southwest Africa, extending from Walfisch Bay to the Kunene River. The area is about 100,000 square miles. The coast region is arid and desert, but the interior contains fertile tracts adapted to agriculture. It has valuable mineral products, including gold, silver, iron, and copper. Cotton, tobacco, silk, fruits, and live stock are the chief products. The drainage is largely toward the east by tributaries of the Zambezi. A large proportion of the inhabitants belong to the Bantu and Damara races. Population, 1915, 200,000.

DAMASCUS (dȧ-măs'kŭs), the capital of the Turkish vilayet of Syria, regarded the most ancient city of the world, called *Dimishk-esh-Shâm* by the natives. The Scriptures mention it on numerous occasions, connecting it with the time of Abraham and successively with other distinguished men, including Saint Paul. It is still one of the largest cities of Western Asia, is beautifully situated in a fertile plain of the same name, and is bounded on the north and west by the high mountain range of Anti-Libanus. Jerusalem is located about 140 miles west of Damascus and a railroad line connects it with the Mediterranean Sea at Acre. While possessing many points of interest which are mentioned by travelers, it contains narrow and angular streets, and in the poorer portions has many low houses that are filled with filth. The courts are paved with marble and ornamented with fountains. Many of the public places are

adorned with trees and beautified by fine architectural structures. The chief buildings include the citadel and the Great Mosque built in the eighth century. About seventy-five mosques of considerable size are maintained in the city, in addition to fully 175 chapels for instruction and prayer.

The Moslems regard Damascus one of the holy cities. Its general features are thoroughly Oriental and it is the gathering place of great companies of pilgrims. Pilgrimages to Damascus began soon after the time of Mohammed, a number of his revelations being associated with it. In several portions are colonies of Christians and Jews, who are allowed religious liberty and educational advantages. Among its notable features are numerous bazaars, the various classes being located by themselves on different streets. Among the bazaars are those of the saddlers, silversmiths, shoemakers, booksellers, and others. In the midst of these stands the Great Khan, which forms a market place for merchants. Straight Street, mentioned in connection with the conversion of Saint Paul, is one of the most important commercial thoroughfares.

Much of the trade of Damascus is in the hands of Europeans. The manufactures include tobacco, fabrics, silk and cotton goods, jewelry, olive oil, damask, soap, and furniture. Formerly the celebrated Damascus steel was produced largely in the city, but its manufacture is no longer carried on. The population is made up of many classes, including Kalmuks, Turkomans, Afghans, Kurds, Circassians, and Europeans. A large trade is carried on with the interior of Asia by caravans of camels, while within the immediate vicinity it is facilitated by a number of canals. The building of railroads, telephone and telegraph lines, and other modern facilities has enlarged its importance commercially. A macadamized road was built between it and Beyrout in 1860. The educational status is somewhat better than formerly, owing largely to the work done by Christians. Damascus has been the seat of much military contention and passed successively under the Israelites, Persians, Greeks, and Romans. It has been under the dominion of the Turks since 1516. Population, 1918, 212,641.

DAMASCUS STEEL, a kind of steel made originally in Syria, so named from Damascus, where it was used largely in manufacturing cutlery and swords. It has been known to Europeans since the time of the Crusades, but the secret of making the Damascus blades, a kind of sword, is not well understood. Damascus steel is noted for its temper, hardness, and durability. It requires careful forging and workmanship and contains a larger per cent. of carbon than ordinary steel. The Damascus blades are beautified by ornamental designs, including inscriptions and landscapes. The art of producing these is called *damaskeening.*

DAMASK (dăm′ąsk), a rich silk fabric originally made at Damascus, from which it is named. It is distinguished by raised figures of animals, landscapes, flowers, and fruits in their natural colors embossed upon a white or colored base. The name is now given to various products made of silk, wool, linen, or cotton, and to a mixture of several of these colored differently. Damask textiles are used for window curtains, fine towels, napkins, tablecloths, and furniture coverings. The figures of fruits, flowers, vases, and other objects placed on the surface are produced by a particular management of the warp threads. Damasks of this character are made extensively in America and Europe.

DAMIEN (dà-myan′), **Joseph de Veuster,** Catholic missionary, born at Tremeloo, Belgium, in 1840; died on Molokai Island, April 10, 1889. He became a priest at the age of nineteen and gave zealous attention to the church. As a missionary at Honolulu his work was effective, but he soon after devoted his attention to the lepers who had been banished to the island of Molokai, one of the Hawaiian group. He settled among them in 1873, officiating as teacher, physician, magistrate, carpenter, and general assistant. In 1885 the dreaded disease laid hold upon him, but he continued his useful service until his death.

DAMIETTA (dăm-ĭ-ĕt′tà), a city of Egypt, on the eastern branch of the Nile, about five miles from the Mediterranean Sea. The main part of the city is built irregularly, but some of the streets are well improved. It is the seat of several European consuls, a Coptic bishop, and an Egyptian governor. Among the public improvements are electric lights, marble baths, and a number of ancient mosques. Large vessels cannot ascend the river to Damietta, owing to sand bars at its mouth. It has railroad connections with Cairo and other centers of commerce. The manufactures include clothing, cotton fabrics, and utensils. It was strongly fortified by the Saracens in the time of the Crusades. The construction of the Suez Canal has caused its commerce to decline. Population, 1916, 32,642.

DAMOCLES (dăm′ō-klēz), a flatterer and courtier of the elder Dionysius, the tyrant of Syracuse. From Cicero we learn that Damocles lauded the happiness of the royalty and that he was reproved by Dionysius in positive terms. While seated at a splendid banquet, surrounded by royal splendor, he looked up suddenly and noticed a keen-edged sword suspended by a horsehair directly over his head. The lesson was a forceful one to teach him the uncertainty of the life and happiness of a king.

DAMON AND PYTHIAS (dā′mŏn, pĭth′ĭ-ąs), the name of two celebrated Pythagoreans of Syracuse, whose faithful friendship is proverbial. Dionysius, the tyrant of Syracuse, had condemned Pythias to die, when he was asked

to allow the prisoner to return home to see his wife and children once more. The request was finally granted, but not before Damon pledged his own life for the reappearance of his friend. In the meantime the river rose on account of great rains and the return of Pythias was delayed, but he appeared at the last moment to save Damon from death. This example of mutual affection so impressed the tyrant that Pythias was pardoned and Dionysius asked to be admitted to their friendship. Upon this historical incident is based the modern fraternal order of the Knights of Pythias.

DAMPS, the name generally applied to gaseous products fatal to animal life. Damps frequently occur in coal mines, wells, and other excavations, especially if they are covered up and unused for some time. *Choke damps* are composed of carbonic acid mixed with carbonic oxide, being so called from their tendency to extinguish life and fire. *Fire damps* consist largely of light carbureted hydrogen and are so named because of their tendency to explode when mixed with atmospheric air, after being brought in contact with a flame.

DAMROSCH (dăm'rŏsh), **Leopold,** composer and conductor, born in Posen, Germany, Oct. 22, 1832; died Feb. 15, 1885. He graduated at the University of Berlin, where he was granted a doctor's degree, and soon established a successful practice in his native city. In 1855 he began to play as a concert violinist, appearing successfully in Magdeburg, and formed the friendship of Liszt. Subsequently he was director of music in Posen and Breslau, came to America in 1871, and engaged as director of the Arion Society in New York City. In 1873 he established the New York Oratorio Society and later the Symphony Society, which he conducted until his death. He is the author of numerous concertos, songs, and cantatas and made many contributions to periodicals.

DAMROSCH, Walter Johannes, musician, son of Leopold Damrosch, born in Breslau, Germany, Jan. 30, 1862. He came to the United States with his father in 1871, took extensive training in music, and assisted in organizing the Symphony Society and the New York Oratorio Society. He became director of the Newark Harmonic Society in 1881, and in 1885 succeeded his father as conductor of the societies organized by him. In 1900 he was made conductor of German operas at the Metropolitan Opera House, New York, and is the author of a number of songs and oratorios. His opera entitled "The Scarlet Letter" is founded on the novel by Hawthorne.

DAMSON (dăm'z'n), the name of a common plum tree which bears small oval fruit. Numerous species have been developed by cultivation. They bear fruit of various colors, such as yellow, bluish, dark purple, and black. They were imported originally from Damascus and are cultivated extensively in the Temperate zones. Some species are used in making a confection called *damson cheese.*

DAN, the fifth son of Jacob, after whom one of the twelve tribes was named. The Danites numbered 62,700 adult males at the time of the Exodus and constituted in point of numbers the second tribe. Samson was a Danite. The tribe lost its identity by mingling with other tribes soon after the time of David. Laish, a city in the northern part of Israel, was renamed Dan after the conquest of Canaan. It was connected with Beersheba in the phrase "from Dan to Beersheba," meaning the whole land of Israel.

DANA (dā'nȧ), **Charles Anderson,** journalist, born at Hinsdale, N. H., Aug. 8, 1819; died Oct. 17, 1897. He was educated at Harvard, after which he joined the Brook Farm community at Roxbury, Mass., where he remained in 1842-44. He was managing editor of the New York *Tribune* for fourteen years, beginning in 1848, and served as Assistant Secretary of War from 1863 to the close of the rebellion. Subsequently he became editor of the Chicago *Republican,* which afterward resulted in a failure. He organized a stock company in 1868 and bought the New York *Sun,* becoming its editor. As a journalist he was able, sarcastic, and critical, and as a politician he was inclined to be erratic and positive. His ability and industry made the *Sun* a powerful factor in American politics. Among his most important writings are "Life of Ulysses S. Grant" and "The Art of Newspaper Making." He was editor of the "Household Book of Poetry," compiler of the "Fifty Perfect Poems," and translator of "The Black Ant." In connection with George Ripley, he edited the "New American Cyclopaedia" and later assisted in its revision.

DANA, James Dwight, naturalist, born at Utica, N. Y., Feb. 12, 1813; died April 14, 1895. He graduated at Yale in 1833 and became a teacher of mathematics at the United States Naval Academy. While serving in the latter capacity, he was sent on an expedition to the Mediterranean for the purpose of making scientific observations. In 1836 he was appointed United States geologist and mineralogist and pursued extensive investigations, which were reported in the "Reports on Zoöphytes," "Reports on the Geology of the Pacific," and "Reports on Crustacea." He was a skillful scientist and had remarkable capacity for research, giving the world much new and useful information. Among his important works are "The System of Mineralogy," "Corals and Coral Islands," "Manual of Geology," "Text-Book of Geology," and "Characteristics of Volcanoes."

DANA, Richard Henry, poet and essayist, born in Cambridge, Mass., Nov. 15, 1787; died Feb. 2, 1879. He studied at Harvard for three years, was admitted to the bar, and applied himself to literature. He became a contributor to the *North American Review* in 1817, remaining

with that periodical for three years, a portion of which time he was associate editor. His writings were effective in cultivating a literary taste and interest in essays. He delivered lectures on Shakespeare and wrote several poems, among them "The Dying Raven" and "The Buccaneer." His most important works in prose were published in *The Idle Man,* a periodical which he issued.

DANA, Richard Henry, lawyer and author, son of the above, born in Cambridge, Mass., Aug. 1, 1815; died in Rome, Italy, Jan. 7, 1882. He studied at Harvard, but was compelled to abandon attendance at the institution on account of impaired sight, and soon after engaged as sailor on the *Pilgrim,* a vessel that sailed to California by the way of Cape Horn. Later he embodied the experiences of his voyage in his celebrated book, "Two Years Before the Mast." Entering Harvard again, he graduated in 1837, and, after studying law, was admitted to the bar in 1840. He aided the movement to form the Free Soil party, and supported the Republican party from its beginning. He made a trip around the world in 1859-60 and, on reaching Massachusetts, was appointed United States district attorney. He was a member of the Legislature in 1867-68, was defeated for Congress by General Butler, and was nominated for minister to England by General Grant, but the appointment was not confirmed. His confirmation was opposed by General Butler and W. B. Lawrence, the latter charging him with infringement of his copyright in revising Wheaton's "International Law." Besides contributing extensively to the *North American Review,* he wrote "The Seaman's Friend," "Memoirs of Edward Channing," and "Memoirs of Washington Allston," and revised Wheaton's "International Law."

DANAIDES (dăn-ā'ĭ-dēz), in Greek legends, the fifty daughters of Danaus, King of Argos. They married their fifty cousins, sons of Aegyptus, and, by the command of their father, who suspected his sons-in-law, they all killed their husbands in one night, except only Hypermnestra, who spared her husband, Lynceus. As a punishment for the murders they were condemned to the lower world and compelled to endeavor to fill with water a vessel full of holes —a never-ending and useless task—in which they were mocked with the delusive hope of ultimate success.

DANBURY (dăn'bĕr-ĭ), a city and one of the county seats of Fairfield County, Connecticut, on the Still River, a tributary of the Housatonic. It is on the New York, New Haven and Hartford Railroad and on several electric lines. The noteworthy buildings include the courthouse, the public library, the city hall, and the high school. It has a fine public park and two monuments, one of which was erected to the memory of General Wooster in 1854. Among the manufactures are boots and shoes, shirts, clothing, sewing machines, machinery, and utensils. It has paved streets, waterworks, electric lights, street railways, and other modern facilities. The first settlement was made in 1684 and it was incorporated as a city in 1889. At the time of the Revolution, in 1777, it was captured by the British under General Tryon. Population, 1900, 16,537; in 1910, 20,234.

DANCING (dăn'sĭng), an amusement or exercise in which one or more persons move the body successively in rythmical order, usually accompanied by music. It consists of steps, bounds, and inclinations of the body, and all the movements are executed with a care designed to make them artistic. In ancient times dancing was a part of the religious observances and worshipers danced before the altars and images of their gods. The Egyptians considered their god Thoth as the inventor of dancing. In Greece it expressed all the different passions from the genteel and beautiful to the dance of the Furies, which inspired the beholders with terror. It played an important part in the sculptures of Greece and was classed with poetry by Aristotle. In Rome dancing was permitted by free citizens only as a religious rite, but in Egypt and India it was employed in public, where dancing and singing girls entertained on public occasions.

Dancing was not practiced extensively after the fall of Rome, largely for the reason that it was discouraged by Christianity on the ground that it was inherited from the Jews and pagan nations. Its revival began in the fifteenth century, when it gained favor in Italy and was introduced by Catherine de' Medici into France. War and harvest dances were given in Germany even before that time. The *carole* and *egg dance* were among the dances of England. Savage warriors practiced dancing to a considerable extent, as exemplified by the American Indians in their celebrated war dances. The Protestant churches either forbid it or look upon it with a measure of disapproval.

The art of dancing has been modified from time to time and has varied in the extent to which it has been practiced. Among the dances characterized as national are the *polonaise* of Poland, the *fandango* of Spain, the *tarantella* of Italy, the *jig* of Ireland and Wales, the *waltz* of Germany, and the *reel* and *Highland fling* of Scotland. The *breakdowns* are popular among the Negroes and the *step dances* and *hornpipes* are quite common among sailors. Among the modern dances common in America are the *quadrille,* the *two-step,* the *polka,* the *lancers,* the *waltz,* the *ballet,* the *galop,* the *cotillion,* and the *schottisch.*

DANDELION (dăn-dē-lī'ŭn), a plant native to Europe, but now common in America. It has a naked, hollow stock, with a composite, bright yellow flower. The leaves rise from a tap root in the form of a bunch. The seed has a white, downy tuft of hair and is scattered extensively

by the winds. In many places the dandelion is an obnoxious weed in lawns and parks. Its blanched leaves are recommended as a salad and are eaten as lettuce in the form of greens. The plant yields a milky juice, which, in the form of extract, is employed for medicine. Its



DANDELION.

1, Floret; 2, involucre and floret; 3, involucre and fruit, 4, fruit with pappus; 5, involucre and ripened fruit.

roots have been used to adulterate coffee in a way quite similar to chicory. Though small in the native state, the plants have been greatly enlarged and improved by cultivation.

DANDOLO (dăn'dō-lō), the name of a celebrated Venetian family, from which four doges came to the republic. Enrico was the most illustrious of its members. He was born in 1110 and died at Constantinople, Turkey, June 1, 1205. His learning and eloquence caused his rapid political rise, and they were instruments that ultimately led to his election as doge in 1192. While in this office he extended the boundary of the republic. He was a distinguished leader of the third Crusade, at which time he conquered Constantinople, following the murder of Emperor Alexius. Soon after he established the empire of the Latins and succeeded in securing the election of the Count of Flanders as emperor. His body was buried in the church of Saint Sophia. Several monuments were erected to his honor, but they were destroyed by the Turks in 1453.

DANE, Nathan, jurist, born at Ipswich, Mass., Dec. 27, 1752; died Feb. 15, 1835. After securing an education, he was admitted to the bar and rose rapidly as a lawyer into high repute. In 1785 he began a three years' service in the Continental Congress, in which he was an influential member. He caused a clause to be inserted in the ordinance for the government of the Northwest Territory which prohibited all laws impairing the obligation of contracts. In making the original draft of that document, he was an assistant to Manasseh Cutler (q. v.). He was elected United States Senator in 1794, serving four years, and established the Dane professorship of law at Harvard, giving a personal donation of $15,000 for the purpose. He published, in nine volumes, "Digest of American Law."

DANENHOWER (dā'nẹn-how-ẽr), **John Wilson,** arctic explorer, born in Chicago, Ill., Sept. 30, 1849; died in Annapolis, Md., March 20, 1887. He graduated from the United States Naval Academy in 1870, accompanied a surveying expedition to the North Pacific, and assisted in subduing a rebellion in Honolulu, Hawaii, in 1873. When General Grant visited Egypt, he served on board the *Vandalia* and joined the *Jeannette* in 1878, which sailed on an Arctic expedition from Havre, France. The expedition passed through Bering Straits and sailed northward in the Arctic Ocean until the vessels were crushed by ice. The crew left the steamer, and, dragging their boats over ice for ninety-five days, embarked in open water, but were separated by a storm. The boat in which Danenhower sought safety entered the Lena delta Sept. 17, 1881, but the others of the crew perished. He arrived in America with several of his crew in June, 1882. The events of this expedition were embodied by him in "The Narrative of the Jeannette."

DANIEL (dăn'ī-ĕl), one of the four greater prophets of the Hebrews. He was a descendant from a celebrated family of Judah, and was carried in youth as a captive to Babylon with other Hebrews in the third year of Jehoiakim, about 604 B. C. He was brought up in the king's service and was chosen to give instruction in the literature and language of the Chaldaeans. After some years he interpreted a dream for Nebuchadnezzar and rose to distinction, being made governor of the province of Babylon and given the office of inspector of the priestly caste. He held this position under Darius and at least until the third year in the reign of Cyrus the Great. His devotion to the worship of God was steadfast and, rather than forsake the teachings of his fathers, he chose to be cast into a lion's den, where he was preserved by angels. Later he assisted his people to return from captivity to their native land.

Daniel wrote one of the most important prophetic books of the Old Testament, which was honored by quotations in the ministry of Christ. It was written partly in Hebrew and partly in Aramaic, and is divided into twelve chapters. The first part is devoted to narratives and the second part to predictions. The history of the Chaldaean, Median, Persian, and Macedonian empires is portrayed in the prophecies of Daniel, and they finally terminate in prophecies of the eternal kingdom of Christ.

The name Daniel is a Hebrew word, meaning God is judge. While in Babylonian captivity, his name was changed to Belteshazzar, meaning the prince whom Bel favors.

DANIEL, John Warwick, statesman, born in Lynchburg, Va., Sept. 5, 1842; died June 29, 1910. He studied at Lynchburg and entered the Confederate army, serving throughout the war. Later he took up the study of law and began to practice in 1866. He was chosen a member of the Virginia House of Delegates for two terms, later served in the State Senate, and was elected to Congress in 1884. In 1887 he was elected to the United States Senate as a Democrat to succeed William Mahone and was re-elected in 1893, in 1899, and in 1905.

DANIELL, (dăn'el), **John Frederick,** celebrated scientist, born in London, England, March 12, 1790; died March 13, 1845. He was a student of Brande and was elected a fellow of the Royal Society in 1814. His inventions include a pyrometer, the hydrometer, and a voltaic battery. The last mentioned, known as the *Daniell battery,* is in extensive use in telegraph offices and wherever a continuous working battery with a low current is serviceable. Among his writings are "Introduction to Chemical Philosophy," "Meteorological Essays," and "Essays on Artificial Climate."

DANIELS, Josephus, public man, born at Washington, N. C., May 18, 1862. He received an academic education, became state printer, and in 1893 was chosen chief clerk of the Department of the Interior. Subsequently he published the *Raleigh News and Observer.* In 1913 he was made Secretary of the Navy.

DANISH WEST INDIES, now the Virgin Islands, a group of three islands situated east of Porto Rico and classed with the Virgin Islands. The area is 138 square miles, which includes some tracts of marshy lands. The area of each of the three islands is as follows: Saint John, 21 square miles; Saint Thomas, 23 square miles; Saint Croix, 74 square miles. A large part of the inhabitants consists of negroes and mulattoes and more than half are on the island of Saint Croix. Christiansted, on Saint Croix, is the seat of local government.

The Danish West Indies, though of little importance commercially, possess value as stations for steamship lines crossing the Atlantic. Excellent harbors are located at Christianstad and Charlotte Amalie, on Saint Thomas, in fact, the latter is one of the deepest and safest in the West Indies. Two cable lines, one French and the other English, connect Saint Thomas with European ports. The exports consist chiefly of sugar and rum, and trade is almost exclusively with the United States and Denmark. A Spanish dialect is the chief language, but English and Danish are spoken in the courts. The revenue has been insufficient to cover the expense for a number of years, owing to the fact that it is obtained chiefly from customs, and the shortage arises because trade is not large. Negotiations were made a number of times to sell the islands to the United States, but in 1902 the treaty of sale was rejected by the Danish Parliament. However, in 1917, the transfer was made in consideration of $25,000,000. These islands are valuable as a defense of the Panama Canal and add to the value of Porto Rico as an American trading center. Population, 1916, 36,152.

DANNAT, William T., painter, born in New York City in 1853. After securing a general education and doing work as a painter, he studied in Munich and Paris, and in the latter city was teacher at the Ecole des Beaux-Arts. In 1881 he became a member of the Society of American Artists and in 1889 served on the International Art Jury. The cross of the Legion of Honor was awarded to him in the latter year. His paintings include "The Quartette," now in the Metropolitan Museum of New York City; "Sacristy in Aragon," in the Chicago Art Museum; and "Lady in Red," in the Luxembourg. A number of his paintings were on exhibition at the Louisiana Purchase Exposition in 1904 and at the Lewis and Clarke Exposition, Portland, in 1905.

DANTE (dăn'tē), **Alighieri,** famous poet, born in Florence, Italy, May 14, 1265; died at Ravenna, Sept. 14, 1321. He descended from an ancient family of the lower nobility, was educated under the learned Brunetto Latini, and became familiar with the sciences of his age and with the writings of many famous poets, including Horace, Virgil, Statius, and Ovid. At Bologna and Padua he studied philosophy, in which he excelled, and later pursued a course in theology at Paris. He met Beatrice Portinari, the daughter of a rich citizen, when she was only eight years old. The impression made upon him and the love he bore for her were a poetic inspiration ever afterward. She married Simone de Bardi, a nobleman, but died young, in 1290. Dante married Gemma, of the powerful house of Donati, some time after the death of Beatrice. Dante took an active part in military activities, engaging in the battle with the Arentines in 1289, and was present at the capture of Ceprona in 1290. When the factional divisions of the Guelphs and Ghibellines agitated Florence, he sided with the latter in opposition to the Guelphs, who were strong adherents of the Pope. Dante was sent to Rome on an important embassy to the Pope, and became at enmity with Boniface because that divine actively favored the Neri as against the Bianchi. His



ALIGHIERI DANTE.

absence from Florence gave his enemies an opportunity to secure a decree of banishment against him and he remained in exile to the end of his life. While in exile he traveled extensively, visiting many European cities of note, but after 1320 he remained mostly with his friend Guido da Polenta, in Ravenna. His death occurred at that city, where his bones are still preserved. His first work, "Vita Nuova," appeared in 1300. It is a poetic collection bearing on his youthful love for Beatrice. His fame rests on his immortal production, "The Divine Comedy."

The republic of Florence set apart a sum of money at the suggestion of Boccaccio about fifty-two years after the death of Dante. This was expended for lectures in which "The Divine Comedy" was explained to the people in one of the churches, the first lecturer being Boccaccio, and later several other cities followed the same course. This poem was instrumental in making the Italian language one of beauty, instead of remaining unformed and rude. It has been translated into many languages, the number being estimated at fully three hundred. The author was spoken of by Boccaccio as a man of medium stature, stooping form, slow in gait and speech, and silent and reserved, but dignified and eloquent when he spoke. Music and painting were objects of his study and devotion.

"The Divine Comedy" was written largely while he was in exile. It has three parts, entitled *Hell, Purgatory,* and *Paradise.* The dreams of the poet carry him into a dusky forest, where he is met by the shade of Virgil, who offers to conduct him through Hell and Purgatory. He may not proceed further, but Beatrice shall lead him through the beauties of Paradise. In the superb imaginative power the journey through Hell is described, and the characters of guilt and punishment are laid before us with a clearness and earnestness that impress one with awe. He ascends with Virgil to Purgatory and beholds similar scenes, though punishment is but temporary. Virgil now leaves him that he may be taken by Beatrice and led to scenes of surpassing magnificence. Ascending with her into the celestial Paradise, passing over seven spheres, he reaches the eighth, where the triumphant Redeemer is surrounded by a glorious company. Dante feels himself in the presence of divine essence when reaching the ninth and in the tenth the Deity himself is sitting, but Dante cannot see him for excess of radiant light. The whole has been magnificently illustrated by the great painter Doré.

DANTON (dăn'tŭn), **George Jacques,** revolutionist, born at Arcis-sur-Aube, France, Oct. 28, 1759; guillotined April 5, 1794. He was educated for the profession of law, practiced at Paris, and became an active leader in the Revolution. He was an organizer with Mirabeau, and with Marat and Camille Desmoulins instituted the Cordelier Club, which was the central resort of the revolutionists. The attacks on the Tuileries Aug. 10, 1792, were due largely to his agitation. Soon after he was made minister of justice, later a deputy from Paris to the common council, and subsequently president of the committee of public safety. As deputy he voted for the death of Louis XVI. and aided in bringing Hérbert and others to the scaffold. Early in 1793 he began to lose prestige with the forces he had aroused, and the tireless Robespierre became the more influential. He was thrown into prison in 1794, and condemned by the revolutionary party as an accomplice in a conspiracy to restore the monarchy and guillotined. He met death in a defiant manner, and predicted the fate of Robespierre with singular certainty.

DANTZIC (dănt'zĭk), or **Danzig,** a seaport of Germany, capital of West Prussia, on the west branch of the Vistula River, about three miles above its mouth. However, its port, Neufahrwasser, is at the mouth of the Vistula. It is strongly fortified by a moat and ramparts and these are strengthened by twenty bastions and several detached forts. Among the principal buildings are a cathedral built in the fourteenth century, the Church of Saint Catharine, several monasteries, synagogues, observatories, and theaters. Langgasse is the finest street in the city, and, owing to its lofty gables built after the style of architecture common to the sixteenth and seventeenth centuries, its appearance is picturesque. Other noteworthy features include the public market, the city library of 150,000 volumes, and the railway depot. The commerce consists largely in wheat, amber, machinery, wool, starch, and leather. Shipbuilding and the manufacture of artillery and machinery engage large numbers of workmen. The general manufactures include hardware, clothing, and textiles. It has extensive railroad and electric railway facilities, municipal waterworks, gas and electric lighting, and stone and asphalt pavements. The first mention of the city was in 997, when it became identified with Christianity. In 1358 it joined the Hanseatic League. It has belonged to Prussia since 1793, except when it was set apart as a dukedom by Napoleon. Population, 1905, 159,648; in 1910, 170,347.

DANUBE (dăn'ūb), the second largest river of Europe, being exceeded in length only by the Volga. The Brege and the Brigach, two streams having their source in the Black Forest of Germany, unite at Donaueschingen and form the Danube. The length is 1,750 miles and the area drained by it includes 315,000 square miles. At the union of the two rivers that form it the height is 2,265 feet above the sea level, the average fall is eighteen inches per mile, and its waters flow through a delta of seven branches into the Black Sea. The principal tributaries are the Drave, Save, Theiss, and Pruth rivers. After leaving Ger-

many, it passes through Austria, between which and Servia it forms a portion of the boundary, thence passes between Servia and Rumania, thence between Rumania and Bulgaria, and thence makes a bold curve north and east to a point between Rumania and Russia, where its waters unite with the sea. Of its 400 tributaries about one hundred are navigable, while Ludwig's Canal connects it with the Rhine and the Moldau and Muhl canals with the Elbe, and several others widen its sphere of commercial importance.

The three principal divisions of the Danube system include the river from its source to Passau, where it leaves German territory; thence the middle course, ending at the Iron Gate, below Orsova; thence the lower course to the sea. The middle course is especially beautiful in scenery, rapids, and cataracts. At the Iron Gate the stream has a width of only 129 yards and its waters are piled up to a depth of twenty-eight fathoms. At each side great ledges of rock tower above the surface and form a continuous line of beautiful panorama. The delta contains a vast area, equal to about 1,000 square miles, covered with dense rushes and cut up by winding channels, where sea birds and various animals find a safe and favorite haunt. Three main channels are included in the delta. They are known as the Kilia, Saint George, and Sulina mouths, and the last named is the one through which ships enter. The mouths farthest apart are sixty miles from each other. Owing to its favorable location through densely populated regions and to its deep water, the Danube is one of the most important rivers to commerce. Great numbers of steamboats ply on its surface and reach hundreds of commercial centers, the total connected navigation facilities constituting about 2,500 miles. The navigation is controlled by the International Navigation Commission, which is composed of delegates appointed by the riparian or great powers. This commission has made extensive improvements in various portions, particularly by a great canal at the Iron Gate.

DANVERS (dăn'vẽrz), a town of Essex County, Massachusetts, about eighteen miles northeast of Boston, on the Boston and Maine Railroad. Among the chief buildings are the State insane hospital, the high school, and the Peabody Institute Public Library. The manufactures include lumber products, boots and shoes, ironware, clothing, machinery, and carpets. It has systems of waterworks, public lighting, and electric street railways. In 1692 it was implicated in the Salem witchcraft delusion. It was incorporated in 1752. Population, 1905, 9,063; in 1910, 9,407.

DANVILLE, a city in Illinois, county seat of Vermilion County, on the Big Vermilion River and on the Big Four, the Wabash, and the Chicago and Eastern Illinois railroads. The surrounding country is rich in coal deposits, building material, and fertile soil. Among the noteworthy buildings are the courthouse, the Carnegie Library, the post office, the high school, and the Y. M. C. A. building. Douglas and Lincoln parks are fine public grounds. It has systems of paving, sewerage, waterworks, and electric street railways. It was settled in 1830 and incorporated in 1867. The manufactures include hardware, cigars, engines, brick, flour, machinery, clothing, and utensils. Population, 1900, 16,354; in 1910, 27,871.

DANVILLE, county seat of Boyle County, Kentucky, forty miles south of Frankfort, on the Cincinnati Southern Railroad. Besides having a fine school system, it is the seat of Cadwell's Female Institute, Danville Theological Seminary, Southern Collegiate Institute, Morrison Female Seminary, Center College, Hogsett Academy, and a State institute for deaf-mutes. The industries include machine shops, grain elevators, and stock yards. It is surrounded by a rich agricultural and stock-raising country. Danville was incorporated in 1789. Population, 1900, 4,285; in 1910, 5,420.

DANVILLE, a borough and county seat of Montour County, Pennsylvania, on the north branch of the Susquehanna River, 150 miles northwest of Philadelphia. It is on the Lackawanna, the Pennsylvania, and the Philadelphia and Reading railroads. The noteworthy buildings include the public library, the high school, the courthouse, and the State hospital for the insane. Among the manufactures are iron and steel wares, silk goods, stockings, suspenders, and custom-made clothing. It has extensive blast furnaces and rolling mills. The surrounding country is rich in agricultural and mineral products. Population, 1900, 8,042; in 1910, 7,517.

DANVILLE, a city of Virginia, in Pittsylvania County, on the Dan River, 140 miles southwest of Richmond. It is on the Danville and Western and the Southern railroads. An abundance of water power for manufacturing is furnished by the river. The manufactures include flour, cotton and knit goods, ironware, cigars, tobacco, clothing, and machinery. The output of the tobacco factories is particularly large. Besides fine public schools, it contains the Roanoke Female College, the Danville Male Academy, and the Danville Female Academy. Among the municipal improvements are gas and electric lights, waterworks, pavements, and an extensive street railway system. Danville was incorporated in 1792. It was the capital of the Confederate States for a short time near the close of the war. Population, 1910, 19,020.

DAPHNIA (dăf'nĭ-ȧ), a genus of freshwater crustaceans, known popularly as the water flea. These animals have a bivalve shell, long swimming antennae, and five pairs of feet. A compound eye is attached to the head, which is elongated into a snout. They are abundant in ponds and are important as the diet of many fishes.

DARDANELLES (där-dȧ-nĕlz), the Hellespont of the ancients, so named from Dardanus, the mythical founder of Troy. The strait is forty miles long and from one to four miles wide. It separates Europe from Asia at this point, and connects the Sea of Marmora with the Aegean Sea. A current flows through it from the Sea of Marmora, which is often increased by winds. The country on the European side is hilly, but is in a high state of cultivation and densely populated, while on the Asiatic side is a fertile plain, rising toward the range of Mount Ida with gradual ascent. Two castles mark the sites of the ancient Sestos and Abydos, while strong fortifications guard it on both sides. In 1841 a treaty was made by the five great powers and Turkey to the effect that no warship shall pass the strait, except with the expressed permission of Turkey. Abydos, on the Asiatic side, is celebrated for the story of Hero and Leander. It is noted for the passage of the armies of Xerxes in 480 B. C., when invading Europe, and that of Alexander in 334 B. C., when leading his famous expedition into Asia. Lord Byron, to demonstrate the possibility of the reputed feat of Leander, swam across the strait. See **War.**

DARE, Virginia, the granddaughter of John White, and the first child born of English parents in America. Mr. White was sent, in 1587, by Sir Walter Raleigh as Governor of the colony of Virginia. She was born in 1587 and named after the region of Virginia. Her husband, Mr. Dare, was an assistant to her father.

DARFUR (där'fo͝or), the name applied to the western portion of eastern Sudan, in Africa. It has an estimated area of 200,000 square miles and a population of 2,500,000. In 1874 it was reduced by Ziber Pasha and placed under the control of Egypt. The British claims were strengthened by an agreement with Germany and Italy in 1891. A battle with the French troops at Fashoda resulted in an agreement between France and England, signed March 21, 1899. By the terms of this treaty the western boundary of Darfur is to mark the sphere of influence between the two powers in Central Africa. The district is drained largely by the head waters of the White Nile and Shari rivers. It contains large tracts of desert lands in the north, but there are quite productive regions toward the south. Cotton, wheat, tobacco, sesame, maize, and fruits are grown. Cattle raising is the principal industry. A majority of the inhabitants are Arabs, who profess Islam. The government is administered from El Fasher, its capital.

DARIEN (dā-rĭ-ĕn') **Gulf of,** a gulf extending from the Caribbean Sea, between the Isthmus of Panama and the mainland of South America. It receives the inflow of several rivers, including the Atrato, has a number of seaports, and is the most prominent inlet on the northern coast of Colombia. The southern portion is known as the Gulf of Urabá.

DARIEN, Isthmus of, the name applied to a neck of land between the Gulf of Darien and the Pacific Ocean, and sometimes to the entire isthmus which connects North and South America, though the name usually applied to the latter is Panama. See **Panama, Isthmus of.**

DARIEN SCHEME, a proposition to establish a colony on the Isthmus of Darien with the view of controlling the trade between the Western and Eastern hemispheres. It was formulated by William Patterson, a Scotchman, in 1695, and about $4,500,000 was subscribed to finance the scheme. In 1698 about 1,200 colonists sailed from Scotland to their prospective new home, which was called New Caledonia. A second company was sent out in 1699 and a third the following year, but the project proved an entire failure. The colonists found the region unhealthful, suffered by disease and starvation, and were harassed by the hostile natives and Spaniards.

DARIUS (dā-rī'ŭs), **I.,** or **Darius Hystaspis,** the fourth King of Persia, born in 558 B. C. He was a Persian of the Achaemenian line, conspired with six other nobles to murder Smerdis, and became king in 521 B. C. Caution and skill made it possible for him to govern vast dominions for thirty-six years. When Babylon revolted, he laid siege for two years and brought that fortified city to terms. Later he organized an army of 600,000 men, with which he crossed the Bosporus by a bridge of boats, intent on conquering the Scythians on the Danube, but retreated and sent an army under Mardonius to invade Greece. The enterprise failed on account of a victory won by the Brygi in Thrace, who cut his army to pieces. Darius promptly organized a second expedition of 500,000 men, but was met by Miltiades with an Athenian army 10,000 strong in the fields of Marathon, in 490 B. C., and was completely defeated. He died in 485 B. C., while engaged in organizing a third expedition.

DARIUS II., King of Persia, an illegitimate son of Artaxerxes I. He was surnamed Nothus and assumed the name of Darius. His reign was characterized by weakness and rebellions among his satraps. He ascended the throne in 423 and died in 404. He was succeeded by his son, Cyrus the Younger, who exercised much influence in the last years of the Peloponnesian War in Greece.

DARIUS III., surnamed Codomannus, the twelfth and last King of Persia. He was a great-grandson of Darius II. His reign began in 336 B. C. and ended with his death in 330. He became famous for his courageous spirit, handsome person, and general interest in his constituents. At the time he ascended the throne, his kingdom was greatly disturbed by the tyranny and luxury of his predecessors and was soon overwhelmed by the advancing oppo-

sition of the Macedonians. His army was defeated on the banks of the Granicus in Asia Minor. Soon after he organized an army of 400,000 to intercept the advance of Alexander the Great in the mountains of Cilicia, but was defeated a second time in the battle near the Issus, in 333 B. C., when his family fell into the hands of Alexander. He collected another army and met the Macedonians in 331 B. C., but was again defeated. Shortly after, Alexander captured Susa, the capital, and made all Persia subject to Greece. Darius was slain as the result of a conspiracy in 330 B. C., and with his death the Persian Empire came to a close. His daughter, Statira, became a wife of Alexander.

DARK AGES, the name applied to a portion of the Middle Ages, including a period of about a thousand years, from the fall of Rome to the revival of letters in the fifteenth century. The period properly commences with the invasion of France by Clovis in 486 A. D., and closes with the invasion of Naples by Charles VIII. in 1495.

DARLEY (där'lĭ), **Felix Octavius Carr,** artist, born in Philadelphia, Pa., June 23, 1822; died March 27, 1888. After securing a common school education, he clerked in a mercantile establishment in Philadelphia and began to produce humorous sketches and book illustrations. Among his productions are about 500 drawings for the works of Fenimore Cooper. He produced illustrations on stone for Irving's "Legend of Sleepy Hollow" and "Rip Van Winkle." A number of his drawings were reduced to appear on bank notes and government bonds. He resided in Europe from 1864 to 1868. After returning to America, he published "Illustrations to Evangeline," "Sketches Abroad with Pen and Pencil," "Outlines to the Scarlet Letter," and "Illustrations of Shakespeare's Plays."

DARLING (där'lĭng), a river in Australia, the largest tributary of the Murray. It is formed by the confluence of several rivers rising in the Liverpool Range, has a length of 600 miles, with its tributaries 1,150 miles, and drains an area of 197,500 square miles. Its confluence with the Murray is at Wentworth, on the boundary between Victoria and South Australia. The name is applied to two districts in Australia, the Darling District and the Darling Downs. The former is in New South Wales and the latter in Queensland.

DARLING, Grace Horsley, famous heroine, daughter of William Darling, keeper of the Longstone lighthouse, born at Bamborough, England, Nov. 24, 1815; died Oct. 20, 1842. A severe storm on Sept. 6, 1838, had wrecked the *Forfarshire* with fifty-three persons on board at Harker's Rock, among the Farne Islands, and was discovered from the lighthouse by Grace Darling. Through the heroic efforts of the maiden and her father nine persons were rescued and brought safely to shore. Many honors were accorded to her on account of this noble feat, besides which she received a purse of $3,500.

DARLING RANGE, a chain of mountains in the western part of Australia, extending parallel with the coast for a distance of nearly 300 miles. The highest summit, Point D'Entrecasteaux, has an altitude of 3,700 feet above the sea. The general altitude ranges from 1,200 to 1,500 feet, and many sections of this range are covered with fine forests.

DARMSTADT (därm'stät), a city of Germany, capital of the grand duchy of Hesse-Darmstadt, situated on the Darm River, fifteen miles south of Frankfort-on-Main. It is the converging center of several railroads and has a large jobbing trade. The streets are well paved with stone and macadam. Among the chief buildings are the palace of Prince Henry, the town hall, the Victoria School, and the Grand Ducal Palace. The last mentioned contains a museum of rare paintings and a library of 500,000 volumes. A fine Doric column rises to the height of 134 feet in one of the public squares, upon which is mounted a statue of the Grand Duke Louis, who founded the newer portion of the city and greatly extended its commercial importance. The manufactures include hats, carpets, chemicals, clothing, and earthenware. It has modern municipal facilities, such as gas and electric lighting, public waterworks, and electric street railways. Darmstadt has been the capital since 1567. Population, 1905, 83,123; in 1910, 87,085.

DARNLEY (därn'lĭ), **Henry Stuart, Lord,** public man, born in 1545; slain in Scotland, Feb. 9, 1567. He was the son of the Earl of Lennox, educated in England, and married Mary, Queen of Scots, in 1565. The marriage proved a very unfortunate one, on account of which he is chiefly known. After the birth of his son, who subsequently became James I. of England and VI. of Scotland, he was stricken with smallpox at Glasgow, and later was conveyed to an isolated house by Mary, where he was confined for some time. The dwelling belonged to Bothwell, who afterward married Mary, and was blown into the air by powder, killing Darnley and several others. It is thought that Bothwell was concerned in the crime.

DARRAH, Mrs. Lydia, heroine, celebrated in the history of the American Revolution. Little is known of her early life, aside from the fact that she was a Quaker and resided in Philadelphia, Pa. The adjutant general of the British army rented one of the rooms in the house where she and her husband resided at the time it held possession of Philadelphia, and it was planned to attack the American army under Washington, then at White Marsh, on Dec. 4, 1777. She had obtained information of the intended attack, procured a permit from Gen. Howe to pass the British lines with the under-

standing that she wanted to get some flour for her family, but at night walked several miles in the snow to inform Col. Craig of the plans of the British. She returned at night without any one knowing of her mission. When the British moved against Washington they found him ready to meet them, hence the attack proved a failure.

DARTER (därt'ẽr), the name of a group of small fishes found in the fresh waters of North America, so named from their quick motion. These fish belong to the perch family, are from six to ten inches long, and are classed among the smallest spiny rayed fish. They frequently lie concealed under stones at the bottom of clear running water, and when hungry or frightened dart suddenly for a short distance. Several species are familiar, most of them frequenting the streams of the central and southern parts of the United States.

DARTER, or Snakebird, a bird native to the tropical parts of most continents, closely allied to the cormorant. The feet are webbed, the bill is longer than the head, and the neck is long and slender. They are called darter from their quick motion. The name *snakebird* is applied to them from the fact that the head is scarcely thicker than the neck, giving that part of the body the appearance of a snake. When frightened while sitting on a branch over a stream, they dart quickly into the water or fly upward and circle in the air like a hawk. They are skilled in catching fish, at which they dart with a sudden and well-directed aim. The American darter is sometimes called water turkey and is about three feet long.

DARTMOOR (därt'mo͝or), an extensive and desolate upland in Devonshire, England, belonging to the duchy of Cornwall. It is noted because of its rugged scenery and as the source of several rivers. A large portion of it furnishes grazing for cattle and sheep during the summer months. The extent is fourteen miles from east to west and twenty miles from north to south, with an area of 150,000 acres. The minerals include China clay and tin. At Lee Moor, which is the seat of a meteorological observatory, are the largest kaolin works in England. A number of earthworks, Cyclopean bridges, and stone antiquities abound. A prison was built on the Dartmoor upland in 1809 for the custody of French prisoners of war. The British impressed about 2,500 American sailors during the War of 1812, confining them in this prison until peace was concluded. The prison incloses about thirty acres and is now used as a depot for convicts.

DARTMOUTH COLLEGE (därt'mŭth), an institution of higher learning at Hanover, N. H. It is the outgrowth of a school which was established at Lebanon, Conn., in 1754, for the Christian education of Indian youth. This school was founded by Eleazer Wheelock and was known as Moor's Indian Charity School, so named from Josiah Moor, who contributed a house and two acres of land. The college received a royal charter in 1769, hence is one of the oldest of New England colleges, ranking next to Harvard and Yale. John Wentworth, the governor of the Province of New Hampshire, gave to the college the name of Lord Dartmouth, who was its most active patron in Great Britain, but he and other Englishmen who contributed to its support withdrew their patronage soon after it ceased to be devoted particularly to the education of Indians. It is at present one of the foremost institutions of higher learning in New England. Though surrounded by religious influences, it is nonsectarian, but it remains an institution for men only. The departments include those of medicine, classics, sciences, commerce and finance, and civil engineering. It has a library of about 100,000 volumes and 20,000 pamphlets. With it are associated the Dartmouth Medical School, founded in 1798; the Thayer School of Civil Engineering, founded in 1867; and the Amos Tuck School of Administration and Finance, established in 1900. In 1917 the academic department of the college was attended by 1,550 students drawn from thirty-five states. The State of New Hampshire attempted to gain control of the college in 1860, which gave rise to a famous case in the lower courts and the Supreme Court of the United States. See **Dartmouth College vs. Woodward.**

DARTMOUTH COLLEGE VS. WOODWARD, a case decided by the Supreme Court of the United States in 1819. It grew out of a controversy between the trustees of Dartmouth College and the Legislature of New Hampshire. George III. granted a charter to found Dartmouth College in 1769, and after the Revolution the State of New Hampshire claimed the same control as was exercised by the throne prior to the independence of the United States. William Woodward held the offices of secretary and treasurer of the corporation of Dartmouth College under the trustees of the college, twelve in number, and a controversy arose between him and the trustees, who removed him from office. In the meantime the State Legislature passed an act to amend the charter so as to supervise the affairs of the college under a new board of twenty-one members. This board appointed William Woodward secretary and treasurer, and the old trustees brought a suit against him to recover the property of the college. A verdict for the defendant was given in the superior court of New Hampshire, but this was reversed on appeal in the United States Supreme Court and the plaintiffs were awarded $20,000 damages. The essence of the decision is that the "charter of Dartmouth College is a contract within the meaning of that clause of the Constitution which prohibits the states from passing any law impairing the obligation of contracts." This

decision was handed down by Chief Justice Marshall. The plaintiffs were represented by Daniel Webster.

DARWIN (där'win), **Charles Robert,** noted naturalist, son of Dr. R. W. Darwin, born at Shrewsbury, England, Feb. 12, 1809; died April 19, 1882. He was a grandson of Erasmus Darwin, a naturalist, and developed an early interest in the natural sciences. In 1825 he entered Edinburgh University, where he attended two years, and in 1831 received a degree at Cambridge. Soon after graduating he was appointed for a hydrographical survey in the South American waters. He sailed on the steamer *Beagle* and spent five years in studying the flora, fauna, and life conditions of many temperate, subtropical, and tropical plants, on account of which he became well equipped for the higher work in which he afterward engaged. In 1838 he was appointed secretary of the Geological Society and the next year was elected to the Royal Society. In the meantime he married his cousin, Miss Wedgwood. While on his voyage of investigation, he kept a careful account of observations and published them in the "Journal of Researches." About the same time he published "Zoölogy of the Voyage of the *Beagle* from 1840 to 1843." He settled in Down, Kent, three years after his marriage and devoted himself to the pursuit of scientific study. His work entitled the "Origin of Species by Means of Natural Selection" was published in 1859. In this treatise he attempted to prove that all the forms of plant and animal life are evolved from other species, and that the evolution is due to natural selection, in which the fittest survive in the struggle for existence.



CHARLES R. DARWIN.

Evolution had been advocated prior to the time of Darwin, but his theories are the first to be discussed in a general way and to arouse widespread and profound consideration. The discussion was often attended by bitter theological and scientific warfare, though his writings are entirely free from personal elements. Darwin was noted for his purpose of honesty, affable character, devotion to his conception of truth, and persistent habits of study. While he is not the originator of the hypothesis of evolution, he is regarded the leading advocate of this theory and directed the most earnest attention to that dogma. Among his writings, besides those named above, are "The Structure and Distribution of Coral Reefs," "The Descent of Man and Selection in Relation to Sex," "Geological Observation in South America," "Fertilization of Orchids," "Insectivorous Plants," "Cross and Self Fertilization in the Vegetable Kingdom," "Formation of Vegetable Mold," "Emotions in Man and Animals," "Principles of Variation Under Domestication," and "The Power of Movement in Plants."

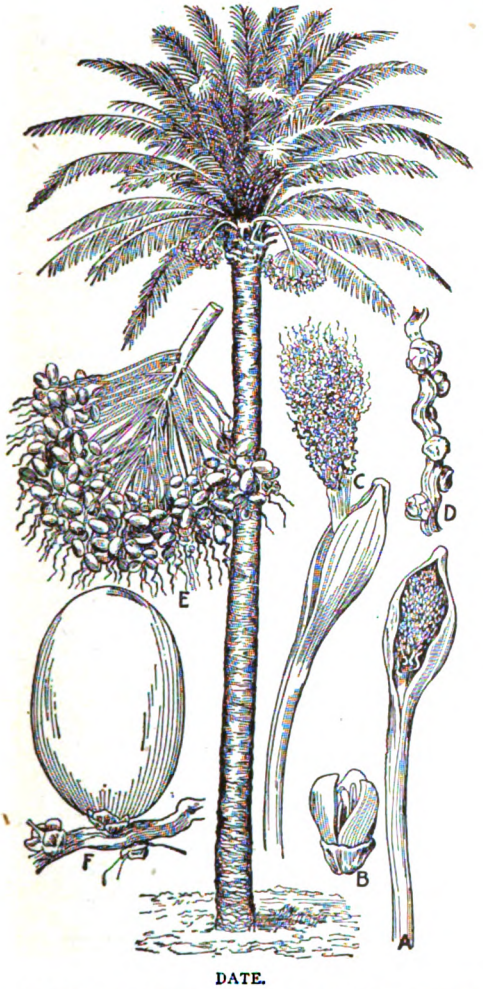
DARWINISM, a term used to designate the views advocated by Charles R. Darwin, relating to the origin of species of plants and animals. The view that all things are susceptible to change by cultivation was held by a vast majority of naturalists before the publications of Darwin became known. It had been demonstrated that hybrids might originate from various species, but writers deemed the hybrids sterile and regarded any further change impossible. The views of Darwin were held by Alfred Russel Wallace and were foreshadowed by Aristotle. The theory of transmutation of species stands in direct opposition to the belief that each species was originally created as a separate type. It embraces the proposition that in every plant or animal exists a certain amount of variability. The offspring differ in some respects from each other and from the parent stock, this becoming aggravated by climatic conditions and environments through long periods of time, as is noticed by the domestication of animals. There is a tendency on the part of each animal and plant to multiply at a geometrical ratio, and, if a single one were not checked, it would in the course of ages fill the earth. On account of this there is a severe struggle for existence, in which all forms of life engage against other forms, and especially against their own kind.

According to this view, the types best adapted for the struggle of life survive, while others die by suppression and defeat. Those which endure are said to do so from *natural selection.* As the offspring of each class of animals and plants resemble the parent stock in most respects, the less improved forms ultimately become exterminated, and each family is continued by the *representative* individual which it embraces. The result of this, and of sexual preference, leads to an endless progression by which evolve higher species, genera, families, orders, classes, and even subkingdoms. The theory may be illustrated by the claim that neither a horse nor an ox existed at a remote time in the past, but there was an animal that had the characteristics common to both. The various changes gave rise to specialized forms, until finally the horse came forth from an ancestor not so specialized as itself, and the ox from another. The theory, more briefly stated, is that the "Creator may have breathed life into one or more forms of life, from which the others originated."

DASYURE (dăs'ĭ-ūr), the common name of a genus of marsupial animals native to Australia and Tasmania. They are allied to the

opossums. Most species are spotted and have bushy tails. The dasyure of Tasmania is light brown or whitish beneath, gray and whitish above, and about two feet long. It lives in burrows, feeds on insects and flesh, and is particularly fond of poultry. Several species of Australia resemble the cat and are quite strong and fierce. Fossil remains of the dasyure are found in many sections of South America.

DATE, the common name of the fruit borne by a number of species of trees which belong



DATE.

A, Male flower cluster; *B*, male flower; *C*, female flower cluster; *D*, female flower; *E*, fruit; *F*, single date.

to the genus *Phoenix dactylifera.* The tree itself is known as the date tree or date palm. It is the palm tree mentioned by classic writers and in the Scriptures. Its nativity is in India, Southwestern Asia, and Northern Africa, where it still flourishes, serving a useful purpose in the domestic and commercial life of the inhabitants. The trees have a straight stem, from twenty-five to sixty feet in height, and are of nearly the same thickness throughout the entire length. Date palms are divided into male and female, the former usually numbering about one in twenty-five when found in palm groves. The pistillate trees bear from 150 to 200 dates. In the larger species the bunches of dates weigh from twenty to twenty-five pounds, hanging below the leaves, at the top of the tree. The Arabs are among the most extensive producers, propagating them from suckers. In the eighth year they begin to bear. They reach maturity at about twenty-five and decline after growing fully a hundred years.

The fruit of the date tree is eaten fresh or is preserved by drying. Large cakes are made of dates by pounding and kneading them together, and these form the principal food of the Arabian caravans that traverse the deserts. Some species are used in the manufacture of wine and a sort of vinegar. The date stones or seeds are ground and fed to camels, or are used as a substitute for coffee. A valuable oil is obtained from the seeds, while in some countries they are used in making ornaments and charms. Baskets, bags, and pouches are made from the leaves, while the fibers found near the bottom of the tree are used for making ropes, and the wood is valuable for fencing and building purposes. The fruit of several species native to Asia is used in the manufacture of toddy, which forms a pleasant drink. The date palm, next to the cocoanut tree, is the most interesting and useful of the palms.

DATE PLUM, the name of several species of trees of the ebony family, usually large, thick-leaved, and hard-wooded. The low-growing date plum tree of Europe produces a small fruit. It is native to the southern portion of that continent. The American persimmon or date plum attains a height of from forty to sixty feet. Its fruit is about an inch in diameter, nearly round, very hard, and eatable after being frosted. The date plum of China is cultivated for its fruit, which resembles a small apple in size, and is useful in making preserves.

DAUBIGNY (dō-bēn-yē'), **Charles François,** landscape painter, born in Paris, France, Feb. 15, 1817; died Feb. 19, 1878. He studied under Paul Delaroche and began to exhibit in the Salon at an early age. In 1857 he was made chevalier of the Legion of Honor, in which he became an officer in 1874. His paintings are very numerous and are praised for their fine effect of light and shade. They include "On the River Oise," "The Valley of Optevoz," "The Apple Orchard," "Beech at Villerville," and "The Sheepfold."

DAUDET (dō-dā'), **Alphonse,** dramatist and novelist, born in Nimes, France, May 13, 1840; died Dec. 16, 1897. He was educated at the Lyons Lycee. When seventeen years of age, he went to Paris, where he became an appointee in the office of the Count of Morny, then president of the legislative corps. His first

book, a work on poetry, was published in 1858, by which he gained a wide reputation, and was soon after employed as a writer on several newspapers. He contributed a number of interesting articles to the *Figaro* and several other publications of wide circulation, and devoted himself with some success to theatrical work. His style is vigorous and lively and his productions generally abound with pathos. Among his best known works are "Tartarin of Tarascon," "Tartarin on the Alps," "Jack," "Sappho," "Immortal," "The Sacrifice," and "Robert Helmont."

DAUGHTERS OF THE AMERICAN REVOLUTION, a woman's society of the descendants of the soldiers and sailors of the Revolution, organized at Washington, D. C., on Oct. 11, 1890. The purpose is to perpetuate the memory of those who fought upon the American side in the War of Independence, to promote the erection of monuments, and to encourage the collection of relics. A site was purchased in Washington, D. C., in 1902 for the purpose of erecting in that city a memorial hall. The society has about 700 local chapters and a total membership of 40,000, and is represented in nearly all states of the United States. A number of chapters are maintained in Canada, the Hawaiian Islands, and Europe.

DAUPHIN (dȧ'fĭn), the eldest son of a French king, prior to the revolution of 1830. The title was originally held by the lords of Viennois, whose province was called Dauphiné. It was first assumed about the middle of the ninth century. The last lord ceded the province to the French king in 1349, on the condition that the title should be forever borne by the heir apparent. The wife of a dauphin was called a dauphine or dauphiness.

DAVENPORT (dăv'ẹn-pōrt), a city in Iowa, county seat of Scott County, on the Mississippi River and on the Chicago, Burlington and Quincy, the Chicago, Rock Island and Pacific, the Chicago, Milwaukee and Saint Paul, and other railroads. Across the Mississippi is Rock Island, Ill., with which it is connected by a number of bridges. The public buildings include the county courthouse, a Federal building, the city hall, the public library, Mercy and Saint Luke's hospitals, Saint Ambrose College, the Masonic Temple, and Griswold College, a Protestant Episcopal institution founded in 1859. It has a number of fine public schools and churches, a State orphan home, and many substantial residences. Rock Island, opposite the city, is a beautiful island several miles long. It is owned by the United States government, and is the seat of an arsenal and of military headquarters.

Davenport is important as a commercial center. It has regular steamship communication with ports on the Ohio and the Gulf. Among the manufactures are clothing, furniture, flour, railroad cars, farming implements, buttons, pottery, and woolen goods. It has large interests in shipping grain and in slaughtering. The streets are generally well improved by grading and paving. Among the public utilities are waterworks, sewerage, electric lighting, and electric street and interurban railways. It was settled in 1854 and named after Colonel Geo. Davenport. In 1838 it was incorporated as a town and in 1851 as a city. Population, 1905, 39,797; in 1910, 43,028.

DAVENPORT, Edward Loomis, actor, born in Boston, Mass., Nov. 15, 1814; died Sept. 1, 1877. After securing an education, he took training for both tragedy and comedy. While popular in America and Europe, he was less accomplished than his daughter, Fanny. He married Fanny Vining, an English actress, in 1849, and was accompanied by her in his starring engagements. His plays were mostly Shakespearean, but he appeared in others and in several of his own authorship.

DAVENPORT, Fanny Lily Gipsy, actress, born in London, England, April 10, 1850; died in Duxbury, Mass., Sept. 26, 1898. She was the daughter of the well-known actor, Edward L. Davenport, and entered upon the stage at the early age of fourteen years, after attending the public schools in Boston. She achieved much success under Austin Daly and ranked among the foremost actresses in high comedy. Besides appearing in Shakespearean comedies, she acted in emotional plays, among them "Theodora," "Cleopatra," "Fedora," and "Camille." In 1879 she married Edwin F. Pierce, but was divorced from him, and soon after married Melbourne MacDowell. While her art was high, the success achieved was due partly to her personal attraction.

DAVID (dā'vĭd), "the beloved," second King of Israel, known and venerated by Christians, Jews, and Mohammedans. His birth is assigned by some writers to 1085 B. C. and his death to 1015. He was the youngest son of Jesse, a citizen of Bethlehem, and descended from the princes of Judah. His life is recorded in the two books of Samuel and in the first book of Chronicles. A portion of the book of Psalms is attributed to his authorship, containing frequent allusions to incidents of his life. He became distinguished by slaying Goliath, the giant of the Philistines, and on account of this heroic deed and his skill with the harp he was taken to the court of Saul and given a military command. The jealousy of the king compelled him to seek safety in the cave of Adullam, near Gath, where he gathered a band of adherents and arranged to attack the enemies of his country and the king. Later he became vassal to the Philistine King of Gath, and, subsequent to the death of Saul and Jonathan, he reigned seven years in Hebron over the tribe of Judah. After the death of Ishbosheth, the son and successor of Saul, he was chosen King of Israel. Conquering the independent city of Jebus, he

made it the seat of government and named it Jerusalem.

Few rulers accomplished more than David, even in the most civilized times. By a system of internal development the kingdom was solidified and public improvements were constructed in all important places. At his own capital he built a palace for himself and securely protected the ark of the covenant. Later he reduced by conquest the lands of the Philistines, Edomites, Aramaeans, and Ammonites, and extended his dominion from the Euphrates to Egypt. His reign included the period from 1047 B. C. to 1015, though some writers assign his government to a later date. In the last year before his death two rebellions occurred under his sons Absalom and Adonijah. The former was slain by Joab and the latter was baffled by Solomon. The Israelites attained their greatest power in the reign of David, which has always been regarded the golden age of Jewish history. Besides a courageous and prudent ruler, he was a lyric poet and became known as "the sweet singer of Israel."

DAVID (dȧ-vĕd'), **Jacques Louis,** painter, born in Paris, France, Aug. 31, 1748; died Dec. 29, 1825. He studied at Paris and Rome and visited many of the European centers of art. His works include many productions in the classic styles. In the Revolution he became prominent in politics, and as a member of the convention voted for the death of Louis XVI. Being a Jacobin and a member of the Committee of Safety, he was twice imprisoned after the fall of Robespierre. Napoleon appointed him first painter in 1804 and gave him a number of commissions. After the fall of Napoleon, to whom he was greatly attached, he was banished and died in exile in Brussels. His greatest work undoubtedly is "The Rape of The Sabines." Other productions include "The Death of Socrates," "The Oath of Horatio," "Paris and Helen," "Brutus Condemning his Son," "The Wrath of Achilles," and "Mars Disarmed by Venus."

DAVID, Pierre Jean, sculptor, born at Angers, France, Mar. 13, 1789; died Jan. 5, 1856. He is generally known as David d'Angers. After studying sculpture in Paris, he spent some time in Rome in company with Canova and Thorwaldsen, and in 1816 returned to France. He acquired a high reputation by producing the statue of the Prince of Condé, and in 1826 was made a member of the Institute. Shortly after the revolution of 1830 he began work on the Pantheon, the pediment of which he filled with sculptures. He made statues of Cuvier and Racine, medallions of Napoleon and Mme. David, and busts of Goethe and Washington, and produced many portraits in bas-relief. In 1848 he was elected a republican member of the national assembly.

DAVIDSON (dăv'ĭd-s'n), **John,** poet, born in Barrhead, Scotland, April 11, 1857. He worked in the chemical department of a sugar refinery when thirteen years of age, subsequently attended Edinburgh University, and was teacher in the schools of Scotland for several years. In 1890 he began a literary career in London by contributing to periodicals and preparing material for books. Among a number of plays worthy of notice is "A Tragic Farce." He gave considerable attention to the publication of pamphlets dealing with public questions, which he published under the general title of *Testaments.* They include the "Vivisector" and "An Empire-Builder." His better known publications include "The Last Ballad and Other Poems," "The Making of a Poet," "New Ballads," and"Fleet Street Eclogue." He died in April, 1909.

DAVIES (dā'vēz), **Sir Louis Henry,** jurist and statesman, born at Charlottetown, Prince Edward's Island, May 4, 1845. He studied at Prince of Wales College, Charlottetown, was admitted to the bar in 1866, and became solicitor-general in 1869. In 1876-79 he was premier and attorney-general of Prince Edward's Island, and was elected to the Parliament of Canada as a Liberal in 1882, serving continuously about twenty-five years. In 1898 he was one of the joint high commissioners on the part of Great Britain to settle all differences with the United States in respect to Canada. He was made Minister of Marine Fisheries for Canada in 1896, serving until 1901, and was appointed one of the judges of the Supreme Court of Canada.

DAVIS (dā'vĭs), **Cushman Kellogg,** statesman, born at Henderson, N. Y., June 16, 1838; died Nov. 27, 1900. He graduated at the University of Michigan in 1857 and began the practice of law, but entered the Union Army as a private at the beginning of the Civil War. After two years he left the service and settled in Saint Paul, Minn., where he built up a successful law practice. He was elected Governor of that State in 1874, became a member of the United States Senate in 1887, and served as Senator until his death. He took rank with the foremost statesmen of the Republican party and succeeded John Sherman as chairman of the Committee of Foreign Relations. At the close of the Spanish-American War he was one of the peace commissioners who concluded the Treaty of Paris.

DAVIS, David, statesman and jurist, born in Cecil County, Maryland, March 9, 1815; died June 26, 1886. After receiving a common school education, he graduated from Kenyon College, Gambier, Ohio, studied law, and began a successful practice at Bloomington, Ill. He was elected to the Legislature in 1844, served as judge of the circuit court three terms, and was appointed by President Lincoln as judge of the United States Supreme Court. He was executor of Lincoln's estate. The National Labor Reform party nominated him for President in 1872. In 1877 he left the supreme bench to succeed John A. Logan in the United States

Senate, and became president of that body after the death of President Garfield. He resigned his seat in 1883. Though an independent in politics, he usually voted with the Democrats.

DAVIS, Henry Winter, statesman, born in Annapolis, Md., Aug. 16, 1817; died Dec. 30, 1865. He graduated at Kenyon College, Ohio, studied law at the University of Virginia, and practiced as a lawyer in Baltimore. In 1854 he was elected to Congress, serving until 1861, and was again a member of Congress in 1863-65. He was first a Whig, then supported the American party, and finally became a Republican. During the war he favored the Union and advocated the abolition of slavery. He was chairman of the Committee on Foreign Affairs from 1863 until 1865.

DAVIS, Jefferson, statesman and President of the Confederate States of America, born in Todd (formerly Christian) County, Kentucky, June 3, 1808; died Dec. 6, 1889. He studied at Transylvania College, Kentucky, and was appointed cadet at West Point by President Monroe in 1824, where he studied four years. After graduation, he held a commission for seven years as lieutenant, and rendered valuable support in the Black Hawk War. He resigned from the military service and married a daughter of General Taylor, after which he settled as a cotton planter near Vicksburg, Miss. He was elected as a Democrat in 1844 to serve in the electoral college that balloted on Polk for the Presidency. In 1845 he became a representative of his district in Congress, but resigned his seat the following year on account of the Mexican War, having been chosen colonel of a Mississippi regiment of volunteers. He served with gallantry in the battles of Monterey and Buena Vista, but was wounded in the latter. He returned home at the close of the war, and was at once appointed to fill a vacancy in the United States Senate, which was soon after approved by the Legislature and, in addition, he was named for a full term. Franklin Pierce appointed him Secretary of War in 1853, and in 1857 he was again elected to the Senate, becoming at once the leader of the Democratic party. He resigned his seat in the Senate when Mississippi seceded from the Union, on Jan. 9, 1861, and was given command of the military forces of his State.



JEFFERSON DAVIS.

When the Confederate States organized an independent government, on Feb. 18, 1861, Jefferson Davis was appointed President by the provisional convention at Montgomery, Ala. He promptly formed a Cabinet and issued a message, in which he commended the attack on Fort Sumter and deprecated President Lincoln's call for volunteers, stating "all we ask is to be let alone." The history of Davis's Presidency is the story of the war. The contest began shortly after he assumed office and closed immediately after he left Richmond. He was elected President for a term of six years on Feb. 22, 1862. Throughout the terrible struggle his was the guiding hand, and upon his careful administration depended the intensity of the contest. In a message dated March 13, 1865, he confessed that the situation had grown grave, but he still held out hope that there were ample means for securing a successful termination. Twenty days after issuing this message he left Richmond, and Lee surrendered to Grant April 9, 1865. Davis proceeded to Danville and later to Greensboro, N. C., where he met Generals Johnston and Beauregard in a conference, and soon after left for Charlotte. He was captured by a company of Union soldiers under Colonel Prichard at Irwinville, Ga., on May 10, while attempting to escape arrest. Subsequently he was confined at Fortress Monroe for two years, during which time the authorities at Washington were deciding what should be done with him, and in 1866 he was indicted for treason. He was admitted to bail on March 3, 1867, but was never brought to trial. The general amnesty issued in December, 1868, included him, but he refused to take the necessary steps to have his political disabilities removed. Later he declared himself still in favor of states' rights and that he would not accept the situation. Davis was a forceful speaker, possessing exceptional executive ability and force of character. He spent the last ten years of his life in Beauvoir, near Biloxi, Miss., and prepared a work in two volumes, entitled "The Rise and Fall of the Confederate Government." His remains were buried at New Orleans, but were removed to Richmond, Va., in 1893, where a fine monument was erected to his memory.

DAVIS, John Chandler Bancroft, jurist and diplomat, born in Worcester, Mass., Dec. 29, 1822. In 1840 he graduated at Harvard and studied law, and three years later began to practice the profession. He entered the diplomatic service as secretary of legation at London in 1849, and in 1869 was elected to the State Legislature of New York. President Grant appointed him Assistant Secretary of State. He represented the United States government in the arbitration of the Alabama Claims at Geneva, Switzerland, in 1871, and resumed the position of Assistant Secretary of State after his return to America. From 1874 to 1877 he was minister to Germany, later became a judge of the court of claims, and was made reporter of the Supreme Court in 1883. Among his books are "The Massachusetts Justice," "Arbi-

tration at Geneva," and "Treaties of the United States."

DAVIS, Nathan Smith, author and physician, born in Greene, N. Y., Jan. 9, 1817; died in 1904. He studied medicine in Fairfield, N. Y., and practiced ten years in Birmingham, after which he became professor of physiology and pathology in Rush Medical College, Chicago. Subsequently he was professor in Northwestern University Medical School, of which he was one of the founders. He contributed to many medical and scientific journals and held offices in numerous educational institutions. Among his works are "Remedial Value and Proper Use of Alcoholic Drinks," "Clinical Lectures," "Essay on the Philosophy of Medicine," and "A History of Medical Education and Institutions of the United States."

DAVIS, Rebecca Harding, novelist, born in Washington, Pa., June 24, 1831; died Sept. 29, 1910. She married L. Clarke Davis, a journalist, in 1863, and contributed many articles and essays to periodicals. Her first short story, entitled "Life in the Iron Mills," was published in 1861 and was praised for its realistic description of artisan life. Among her publications are "A Law unto Herself," "Waiting for the Verdict," Bits of Gossip," "Kitty's Choice," and "Silhouettes of American Life."

DAVIS, Richard Harding, novelist and journalist, son of Rebecca Harding Davis, born in Philadelphia, Pa., April 18, 1864. He studied at Lehigh University and Johns Hopkins University and began the career of a journalist. In 1888 he became connected with the New York *Evening Sun,* in which his first important stories were published. Two years later he was appointed manager of *Harper's Weekly.* He served as war correspondent to different papers in the Turkish-Greek, the Spanish-American, the Anglo-Boer, and the Russian-Japanese wars. His books include "Stories for Boys," "Van Bibber and Others," "Our English Cousins," "The Princess Aline," "Soldiers of Fortune," "The West from a Car Window," "Cuban and Porto Rican Campaigns," "With Both Armies in South Africa," "The Bar Sinister," and "Kits and Outfits." He died April 11, 1916.

DAVIS, Varina Anne, the "Daughter of the Confederacy," born at Richmond, Va., in June, 1864; died Sept. 18, 1898. She was the daughter of Jefferson Davis and was born while he was in the State house of the Confederacy. After receiving an education, she developed more than ordinary ability as a painter, musician, and writer. Among her writings are "An Irish Knight," "On Summer Seas," "The Veiled Doctor," and "Foreign Education for American Girls."

DAVIS STRAIT, the portion of the sea which separates Baffin Land from Greenland and connects Baffin Bay with the Atlantic Ocean. The width is from 180 to 500 miles. It is valued for its whale fisheries. An Arctic current flows southward through this strait and passes along the Atlantic coast of America. It is thought to be the Ginnunga Gap spoken of in the Norse Sagas.

DAVITT (dăv'ĭt), **Michael,** public man, born in Straide, Ireland, March 25, 1846; died May 31, 1906. His parents were tenants and were evicted from their farm in 1850 on account of poverty. He was a factory hand in the cotton mills at Haslingden, where he lost his right arm, and at the age of fifteen engaged to work in a printing office. In 1867 he joined the revolution that sought to free his country from England, and was sentenced to fifteen years' imprisonment for transporting arms into Ireland, but was released in 1875. He made a lecturing tour of the United States to raise funds with which to liberate Ireland from landlordism, and in 1879 organized the Irish Land League. The following year he was arrested under the Coercion Act and kept in prison fifteen months, after which he was released and in 1882 elected to Parliament, but was not allowed to serve. In 1893 he was again elected to Parliament but was compelled to vacate on account of bankruptcy, and was again elected in 1895 and served until his resignation in 1899. He published many works of public interest and was an opponent of Parnell, although in sentiment a strong advocate of home rule. His publications include "Impression of Australasian Democracy," "Defenses of the Land League," and "Leaves from a Prison Diary."

DAVY (dā'vĭ), **Sir Humphry,** famous chemist, born in Cornwall, England, Dec. 17, 1778; died on May 29, 1829. He attended school at Truro until fifteen years of age, studied chemistry, and later became an assistant in the Pneumatic Institution at Clifton. Classic learning and poetry were his favorite studies, and his retentive memory made him an interesting and versatile story-teller. His experiments, of which he made many, were largely in gases, in which he almost sacrificed his life many times. Accounts of his researches established a reputation that led to his appointment as a lecturer to the Royal Institution of London, where his ability and remarkable experiments attracted much attention and large audiences. He began researches in agriculture in 1803, and made them the basis of a systematic lecture course. Soon after he discovered that alkalis and earths are compounds formed by a union of oxygen with metallic bases.

Davy first succeeded in decomposing potash in 1807, and was so much delighted with his success that he was overcome with enthusiasm. Later he decomposed alkaline earths, soda, lime, magnesia, and other substances, and discovered sodium, calcium, magnesium, and barium. In 1812 he was knighted and soon after entered upon an expedition to investigate the theory of volcanic action. He returned to England in 1815 and later investigated the nature of fire

damps, the explosions of which had caused much damage in mines. From these investigations he was enabled to invent a safety lamp. On account of this he was granted a baronetcy and later became president of the Royal Society. His attention was next directed to the preserving of the copper sheathing of vessels from corrosion by the action of sea water, which led to no definite results. Among his numerous writings are "Elements of Agricultural Chemistry," "Chemical Agencies of Electricity," "Elements of Chemical Philosophy," and "Last Days of a Philosopher."

DAWES (dạz), **Henry Laurens,** statesman, born in Cummington, Mass., Oct. 30, 1816; died in 1903. After graduating from Yale in 1839, he engaged in teaching. Subsequently he became editor of the Greenfield *Gazette* and afterward of the Adams *Transcript.* After reading law, he was admitted to the bar and was elected to the Legislature in 1848. He served as a member of Congress from 1857 to 1873, where he distinguished himself on behalf of Indian education. He served on important committees and was the author of several tariff bills. In 1869 he introduced the measure which originated the weather bulletins, thus paving the way to gather weather reports from all parts of the country and making it feasible to predict as to coming storms. He served in the United States Senate from 1875 to 1893, where he was as influential and useful as in the House of Representatives.

DAWSON (dạ'sŭn), a river port of Canada, capital of Yukon, on the Yukon River. It is finely situated at the confluence of the Klondike and Yukon rivers, about 330 miles northwest of Skagway, on an elevation 1,450 feet above the sea. The surrounding country is a gold-mining region. Its importance dates from 1896, when gold was discovered on Bonanza Creek. The chief buildings include a number of schools and churches, several theaters, a public library, and the buildings occupied by government officials. It is connected with the coast by telegraph lines and has local telephone service. Transportation is chiefly by steamers on the lower and upper Yukon. It was so named from George Mercer Dawson, a noted geologist of Canada. Population, 1901, 9,142; in 1911, 3,013.

DAWSON, George Mercer, scientist, son of J. W. Dawson, born at Pictou, Nova Scotia, Aug. 1, 1849; died March 2, 1901. He was educated at McGill University and the Royal School of Mines, London, where he distinguished himself as a student of marked ability. In 1873 he was appointed geologist and naturalist to the British North American boundary commission, and as a result published a report entitled "Geology and Researches of the Forty-ninth Parallel." Later he traveled extensively in Europe inspecting mines, museums, and metallurgical works, and was made leader of the Yukon expedition in 1887. In 1891 he served with Sir George Baden-Powell as British Bering Sea commissioner. The Geological Society of London awarded him the Bigsby medal in 1891, and he was shown distinguished honors by numerous institutions, including the honorary degree of McGill University and of Queen's University. Among his later writings are contributions to the *Quarterly Journal* of the Geological Society of London, to the *Canadian Naturalist,* and to "Transactions of the Royal Society of Canada."

DAWSON, Sir J. William, geologist, born in Pictou, Nova Scotia, Oct. 13, 1820; died in Montreal, Nov. 8, 1899. His education was secured at Pictou College and Edinburgh University, where his efforts were marked by much interest in scientific studies. He devoted some time to studying the fossil plants and the Nova Scotia formation, and contributed numerous papers on coal measures and other interesting subjects to magazines and periodicals. In 1820 he was made superintendent of education for Nova Scotia and became associated with Charles Lyell as a contributor to the transactions of learned societies, thereby winning distinction at home and abroad. In 1855 he was appointed principal of McGill University and professor of natural sciences, which positions he held until 1893. His close insight into educational affairs led to the establishment of the McGill Normal School for the training of teachers. He was knighted in 1884, received the Lyell medal of the Geological Society of London, and became first president of the Royal Society of Canada. Among his contributions to the literature of geology are "The Dawn of Life," "Science and the Bible," "The Story of the Earth and Man," "Geological History of Plants," "Fossil Men and their Modern Representatives," "The Origin of the World," "Chain of Life in Geological Time," "Hand Book of Geology," and "Modern Ideas of Evolution." The last mentioned is a highly valuable work in opposition to the theories of Darwin.

DAY, the term employed originally to distinguish the time of daylight from the space of night or darkness, but now used more frequently to denote the complete alternation of light and darkness caused by an entire rotation of the earth upon its axis. Only one-half of the earth can be in the light of the sun at once, owing to its being a sphere. Night is merely the shadow of the earth, the two, day and night, covering equal portions of the earth's surface, and together constituting twenty-four hours. The alternations of light and darkness are caused by the rotation of the earth upon its axis, and, on account of it, the several portions of the surface have each a proportional share of light and darkness. The length of each varies at different seasons of the year, owing to the continual parallelism of the axis of the earth to any former position. The fact that different portions of the earth's surface are being turned consecu-

tively toward the sun constitutes the cause of both the change of seasons and the variations of the length of day and night.

A *solar day* is measured from the sun's coming to the meridian and again returning to it. Owing to the revolution of the earth around the sun, the solar day varies in length. It is about four minutes longer than the *sidereal day*. The latter is measured by the time of a star's coming to the meridian and returning to it on the immediate subsequent night. The mean solar day is twenty-four hours, and the mean sidereal day is twenty-three hours, fifty-six minutes and 4.098 seconds. This difference is due to the sun's apparent movement at a slow rate to the east through the stars, by which they reach the meridian in a shorter time than the sun does, if estimated by sun time. The interval existing between two successive transits of the sun across the meridian is called an *apparent day*, while the *astronomical day* is a day beginning, since January, 1885, at noon and extending to the next. It is divided into twenty-four hours, not into two periods of twelve hours each. The day at the Equator is always twelve hours, while the longest day at the poles is six months. On the 21st of March and the 21st of September the days and nights are equal in all parts of the earth.

In different countries the day is counted to begin at different times. The Jews began the day at sunset and the Babylonians at sunrise; while the Egyptians and Romans counted from midnight, which is the basis used by most modern peoples. The Latin *post meridiem*, meaning afternoon, is abbreviated by writing P. M.; and *ante meridiem* (forenoon), by writing A. M. These are necessary on account of dividing the common clock time, or day, into two portions of twelve hours each.

DAY, William Rufus, statesman, born in Ravenna, Ohio, April 17, 1849. He attended the public schools and the University of Michigan, from which he graduated in 1870, and, after studying law, was admitted to the bar in Ohio. In 1886 he was elected judge of the court of common pleas as a non-partisan. He succeeded John Sherman as Secretary of State in 1898, having previously served as Assistant Secretary, and in the same year resigned to become chairman of the United States Peace Commission in Paris, which made a treaty to terminate the war with Spain. President McKinley appointed him as judge of the sixth circuit of the United States circuit court, in which office he served successfully. He published a number of able documents and State papers. In 1903 he was made an associate justice of the Supreme Court by President Roosevelt.

DAY LILY, a genus of plants belonging to the lily family, native to Europe and Asia. Several species are cultivated in the flower gardens of America, especially the fragrant yellow day lily. These plants include many species that are noted for the variegated colors of their flowers. The leaves are long and grow from the ground and the stem is branching. In some parts of Europe the day lily is cultivated to furnish food for cattle.

DAYTON (dā'tŭn), a city of Kentucky, in Campbell County, on the Ohio River, opposite Cincinnati. It is on the Chesapeake and Ohio Railroad. The noteworthy features include the city hall, the high school, and the Speers Memorial Hospital. Among the manufactures are cigars, machinery, cordage, shoes, and spirituous beverages. It was settled in 1849 and was incorporated the same year as Jamestown, but the name was changed to Dayton in 1893. Population, 1900, 6,104; in 1910, 6,979.

DAYTON, a city of Ohio, county seat of Montgomery County, sixty miles northeast of Cincinnati. It is on the Pennsylvania, the Erie, the Big Four, the Dayton, Lebanon and Cincinnati, and other railroads, and on the Miami and Erie Canal, which connects Lake Erie with the Ohio River. The city is divided by the Great Miami River, which is joined here by the Mad River. It is beautifully platted with wide streets, has extensive urban and interurban electric railways, and in the vicinity are numerous macadamized highways. Many of the streets are paved substantially with asphalt and stone. Twelve bridges span the river, a number of which are constructed of concrete. The city has fine systems of waterworks and sewers.

The business section is located near the river, whence the ground rises to heights of from 200 to 300 feet, and the residence sections are chiefly on these more elevated parts. The notable buildings include the courthouse, the Union Passenger station, the Steele High School, the Y. M. C. A. building, the Dayton State Hospital, and a large number of fine business blocks, the last mentioned including the Arcade and the Conover. Among the educational and charitable institutions are the United Brethren Theological Seminary, the Academy of Notre Dame, the Saint Elizabeth's Hospital, and a number of manual training and commercial schools. The public library is located in the center of the city, in Library Park. Near the city is the National Military Home for disabled soldiers of the Civil War, which occupies a beautiful tract of 640 acres. Dayton is the seat of the State asylum for the insane and the county orphan asylum. It has a handsome soldiers' monument and numerous fine boulevards.

The city takes high rank as a manufacturing and wholesaling center. Among the chief manufactures are railway cars, flour, bicycles, electrical machinery, automobiles, steam pumps, cash registers, stoves and hardware, cotton and woolen goods, and agricultural implements. In the vicinity are extensive limestone and marble quarries. The first settlement was made on its site in 1796, after a tract of land had been purchased from the Indians by a company which in-

cluded Jonathan Dayton, from whom the city received its name. In 1805 it was incorporated as a town. It received its charter as a city in 1841 and since then has had a prosperous growth. It was visited by an epidemic of cholera in 1849 and was several times damaged by floods. Population, 1900, 85,333; in 1910, 116,577.

DAYTON, William Lewis, statesman, born in Somerset County, N. J., Feb. 17, 1807; died Dec. 1, 1864. He graduated from Princeton College, studied law, and entered upon a successful practice in Trenton, N. J. In 1837 he was elected to the State Senate and was a United States Senator in 1842-51. He joined the newly formed Republican party and was nominated for Vice President on the ticket headed by John C. Fremont in 1856. President Lincoln appointed him minister to France in 1861, in which position he served the remainder of his life.

DEACONESS (dē'k'n-ĕs), name of an order maintained among the women in the Christian churches. An order of deaconesses is mentioned in the New Testament, in I. Tim. v., 9-10 and Rom. xvi., 1. It appears that this order was established in Apostolic times, when the deaconesses assisted in the work among members of their own sex and to some extent supplemented that of the deacons. In the early centuries it was connected with the Roman Catholic Church, but was abolished in the twelfth century. Theodor Fliedner, a pastor of the United Evangelical Church of Germany, founded a home for deaconesses in 1836, in which it was made the duty of the inmates to do charitable work. Since then many similar homes were established in Germany and other parts of Europe, such as the various sisterhoods in the Anglican Church of England.

Among the first order of deaconesses established in America is that of Saint Andrew's Parish, Baltimore, Md., under the auspices of the Protestant Episcopal Church in 1855. The order is recognized by the Lutheran Church in America, which erected the Drexel Home for Deaconesses at Philadelphia, Pa., in 1888. In the same year the order was established by the general conference of the Methodist Episcopal Church. It is sanctioned by the Presbyterian and other Protestant churches, and many homes are maintained both in Canada and the United States. The work of the deaconesses in the different churches is quite similar. As a whole the order may be said to constitute an independent society of charitable women, including many trained nurses, who do a noble work in relieving suffering and in spreading Christianity.

DEAD LETTER, a letter that lies at a post office unclaimed for a certain period, or one so defective in address that it cannot be delivered. The postal departments of Canada and the United States maintain dead-letter offices, in their seats of government, where all unclaimed letters are sent, including those that do not show the address, or are unstamped. These letters are opened at the dead-letter office, and, if the address of the writer is found, they are returned to the sender; otherwise, they are destroyed. Not less than 8,000,000 pieces of mail matter that find their way annually to the dead-letter office of the United States, of which about 4,000 do not contain the addresses of the senders. The money and drafts found in letters are returned to those by whom the letters were mailed, if their names and addresses are known, while many periodicals, magazines, and picture cards are sent to various hospitals and libraries.

DEAD SEA, a remarkable lake in the southern portion of Palestine, in the pashalic of Damascus. In the Scriptures it is called the Sea of the Plains, Salt Sea, and East Sea, and is thought to be the site of the ancient Sodom and Gomorrah. It is located about twenty miles southeast of Jerusalem and ten miles south of Jericho, where it stretches north and south a distance of forty-five miles, and has a width of ten miles. It receives the waters of the Jordan and numerous other rivers, though its surface, owing to the arid climate, is 1,317 feet below the level of the Mediterranean. It is bordered by lofty cliffs of limestone along its eastern and western shores, while its northern and southern extremities are marked by low and dismal marshes. Violent earthquakes that occurred in periods far remote are evidenced by lava and volcanic deposits. Thermal and sulphur springs, pumice stone, rock salt, and other phenomena abound.

The water of the Dead Dea is remarkable for the quantity of its saline ingredients. In every hundred pounds of its water there are over twenty-six pounds of saline substances, more than one-fourth. It is nauseous to the taste and smell, and so buoyant that the human body floats upon its surface. The maximum depth in the central portions is 1,315 feet, while the southern lagoon is twelve feet deep in the middle, and at the edges not more than three feet. Geologists have advanced the theory that the inflowing waters carry sufficient saline matter to transform the lake into solid saline deposits within a considerable period of time, unless present conditions become greatly modified by climatic or volcanic changes. The saline density increases as the arid atmosphere carries off inflowing moisture by means of evaporation.

DEADWOOD, county seat of Lawrence County, South Dakota, in the Black Hills, on the Chicago and Northwestern and the Chicago, Burlington and Quincy railroads. It is surrounded by a mining region which produces gold, silver, tin, lead, and clays. The chief buildings include the high school, the Franklin Hotel, and the Masonic Temple. Among the industries are flouring mills, brick and lime works, smelters and reduction works, and ma-

chine shops. It has waterworks, electric lights, macadamized streets, and telephone connections. Deadwood was settled in 1876 and owes its growth largely to the development of its mining interests. Population, 1910, 3,653.

DEAF-MUTES (dĕf'-mūts), the persons who are deprived of both hearing and speech, the dumbness resulting principally from deafness existing either at birth or in very early childhood. Dumbness results in this way because deaf children, being deprived of the sense of hearing, are unable to imitate sounds. Imitation being the basis of learning to utter regular sounds, deafness in early life, therefore, is the most prolific cause of dumbness. The per cent of deafness varies somewhat in the different nations and stages of social and intellectual development, but usually rates one affected individual to every 1,500 to 1,800, the mean being about the usual average. Among the most prolific causes are local or climatic conditions, ill health of the mother, scrofula, and the heredity of certain physical defects. It is certain that deafness is not communicated by heredity, since what is transmitted is but the tendency to such disease, or some anomaly of the auditory organs or of the nervous system, of which deafness is the result or symptom.

Investigations made by the government indicate that about nine per cent. of the children born of deaf and dumb parents, or of whom one is thus affected, inherit tendencies to deafness. This is in accord with the law of heredity, that the offspring tends to revert to the normal type. Deafness is frequently acquired in old age and through such diseases as measles, paralysis, typhus, smallpox, and other cerebral affections, and particularly through violent attacks of scarlet fever, by which the patient suffers from an inflammatory state of the throat, which extends to the internal ear and more or less suppurates and destroys the delicate portions of the auditory organs. No defect is visible in most deaf-mutes, and no application has yet been discovered to render cure possible. Deaf-mutes are obliged to observe and imitate the expressions and actions which attend various states of the mind, by means of which they communicate their feelings and desires to others. This has resulted in the development of the *sign language,* through whose agency deaf-mutes have learned to acquire considerable advancement in educational arts.

Among the early discoverers of the principles underlying the teaching of deaf-mutes is Jerome Cardan (1501-1576), an Italian physician, who published a treatise on the association of writing with speech, and speech with thought, pointing out the fact that written characters and thought can be associated without the intervention of vocalized sound. The practical instruction of deaf-mutes was demonstrated in France in 1743 before the Academy of Sciences, which institution attested the methods employed by Jacob *R.* Pereira (1715-1780), a Spanish teacher. In the United States there are ninety schools, including both public and private, for deaf-mutes. They are attended by more than 10,000 students. Nearly all the states have institutions supported by public appropriations for the instruction of deaf-mutes. A national college is located at Washington, and is under the immediate direction of the United States. Conventions and institutes of deaf-mutes have been held in the United States for more than fifty years, while the *American Annals of the Deaf and Dumb* has been published since 1847. The method employed makes use of the manual alphabet, combining it with observations of the lips of the teacher. There are two alphabets—a *one-handed* alphabet and a *two-handed.*

The method of teaching by watching the lips during articulation was first advocated by Samuel Heinicke (1729-1790), an educator of Germany. It is known as the *articulation and lip-reading* method. A public institution based upon his theory of instruction was established in 1779 at Leipzig, Germany, and the institutions of Germany and Austria are still based upon this system. The pupil is taught to recognize words by observing the motion of the lips and tongue of the instructor, who also makes use of diagrams and pictures to facilitate the work. Persons trained by this method are efficient in carrying on a conversation with any one not taught in deaf-mute methods, and it is often quite difficult to see that the speaker is afflicted in any way. In this respect it is superior to the alphabet method, but, like the latter, it is used within sight of the person with whom the conversation is conducted. The German method was adopted by the Clarke Institute at Northampton, Mass., in 1867. In this system pupils are not instructed as early as in public schools, or in courses using the alphabet method. However, it is quite certain that the articulation and lip-reading method is the superior, and is either used or largely combined with the other method in nearly all the schools for deaf-mutes.

DEÁK (dā'āk), **Franz,** statesman, born in Kehida, Hungary, Oct. 17, 1803; died at Budapest, Jan. 29, 1876. He studied at Raab, entered upon the practice of law, and became noted for his eloquence and enlightened patriotism. In 1832 he was elected to the Hungarian diet, where he became a leader of the liberals. He was chosen minister of justice in the national cabinet after the Hungarian revolution, and effected many reforms in the administration of justice. He resigned his portfolio when Kossuth came into power on Sept. 17, 1848, living in retirement until 1860, when he became leader of the moderate party. In 1861 he drew up an address to Francis Joseph, Emperor of Austria, demanding the constitution of 1848. The request was refused at first, but, after the success of Prussia against Austria in 1866, the constitu-

tion was granted. The union of Austria and Hungary in the dual form of government is due largely to him, under which the Emperor of Austria is also King of Hungary, and the people of the latter country are granted equal liberties and constitutional rights with those of Austria. His death was mourned by the entire nation and has been commemorated as a national event.

DEAKIN, Alfred, public man, born in Melbourne, Australia, Aug. 3, 1856. He studied at the university of his native city and was elected to the Parliament of Victoria from West Bourke in 1879. Later he was reëlected several times consecutively and in the meantime held a number of public offices, such as solicitor-general and minister of public works. In 1901 he was made the first attorney - general of the Commonwealth of Australia, serving until 1903, when he became Prime Minister, but was succeeded by Watson the same year. He was again elected Prime Minister in 1905 and 1906. Deakin was not only an acknowledged leader in the Commonwealth, but was vigorous as a supporter of the fiscal policy of Joseph Chamberlain. He published "Irrigation in Egypt and Italy," "Temple and Tomb," and "Irrigation in Western America."



ALFRED DEAKIN.

DEANE (dēn), **Silas,** diplomatist, born in Groton, Conn., Dec. 24, 1737; died in Deal, England, Aug. 23, 1789. He graduated from Yale in 1758, served as delegate from his State in the Continental Congress of 1774-76, and in the latter year accompanied Benjamin Franklin to France on a political and financial mission. He was largely instrumental in securing the assistance of Lafayette, De Kalb, and others to aid in the American cause. Owing to some misapprehension regarding promises and extravagant contracts, he was recalled by Congress in 1777, and later returned to France to secure proof that he was not blamable, but found that country unfriendly to his mission. He died in poverty among strangers, and an investigation made in 1842 showed that his country wronged him through the charges of political enemies. The government of the United States paid a large sum of money due him to his heirs. Among his writings regarding the interesting question of faithful service he published the following: "Address to the Citizens of the United States," "Paris Papers," and "Letters to Hon. Robert Morris."

DEARBORN (dēr'bŭrn), **Henry,** physician and soldier, born in Hampton, N. H., Feb. 23, 1751; died June 6, 1829. After extensive study, he entered upon the practice of medicine in 1772 at Nottingham Square, and took training in military tactics during his leisure hours. He gathered sixty minutemen and the day following the Battle of Lexington marched to Cambridge and covered the American retreat at Bunker Hill. He was taken prisoner while with Arnold's expedition at Quebec, but later fought at Stillwater, Saratoga, Monmouth, Newtown, and at the siege of Yorktown. In 1789 he was appointed United States marshal for Maine by President Washington, was twice elected to Congress, and served eight years as Secretary of War under President Jefferson. At the beginning of the War of 1812 he was advanced to be major general, was made commander of the northern department, and rendered efficient service as a leader to the Americans. He captured York (now Toronto) and Fort George. President Monroe appointed him minister to Portugal in 1822, in which position he served two years.

DEARBORN, Fort, a fortress built in 1803 at the mouth of the Chicago River, near Lake Michigan, on the site of Chicago. Its purpose was to form a defense against the Indians. When war was declared against England in 1812, General Hull, the commander, ordered its abandonment and the withdrawal of the garrison to Detroit as a measure of safety. The Americans were attacked by Indians while retreating and two-thirds were massacred, including twelve children. The remainder surrendered on promise of safety and were permitted to return to their homes, after being taken to Fort Mackinaw. In 1816 Fort Dearborn was rebuilt and was garrisoned till 1837. The last building was destroyed in the Chicago fire of 1871.

DEATH (dĕth), the extinction of life in animals and plants, resulting from a cessation of the vital functions. It sometimes occurs from decay of nature, as in old age, but more commonly from disease and accident. The two forms consist of death of the whole body, and death of a portion, or the *somatic* and the *interstitial.* There are three principal modes of dying—those that begin at the lungs, heart, and brain—and they are respectively designated as suffocation, syncope, and coma. Death by *suffocation* begins at the lungs. In this form the functions of respiration are suspended, after which the heart ceases beating in about three minutes, though the pulse may be felt for some time after all other signs of life have vanished. When the action of the heart ceases from loss of blood, death results by *syncope,* or *fainting.* Death may likewise take place in this form by a decline of the aortic pressure of the heart, by a loss of nerve power, and by starvation. Death by *coma* begins at the brain. It is indicated by profound stupor and the breathing is accompanied by snoring. Human life is of longest duration in individuals that have exercised the

powers of the brain, generative system, and other vital organs in moderation, and is curtailed both by disuse and excess. Death ensues when all vitality and power of action is extinct. The claim that a dead body may possess all the organizations it had in life is not to be credited, since death is an entire cessation of all organization and vitality.

DEBORAH (dĕb'o-rah), the name of two characters mentioned in the Bible. The first lived about 1857 B. C. and is mentioned on the occasion of her burial at Bethel, under the tree of Allon-bachuth. The other lived about 1316 B. C., is regarded the mother in Israel, and was a prophetess, but is called a judge by some. Her patriotism led to the delivery of the Hebrews from the oppression of the Canaanites, under which they had suffered twenty years. The Song of Deborah is recorded in Judges v., and is one of exultation over the deliverance of the nation. The Old Testament contains no poetry of greater beauty, though it is thought to constitute the oldest portion of the Scriptures. Deborah is credited a member of the tribe of Ephraim.

DEBRECZEN (dĕ'brĕ-tsĕn), a city of Hungary, capital of the county of Hajdú, 135 miles east of Budapest. It is located on a fertile plain, has railroad facilities, and is noted as a market for cattle and swine. The manufactures include soap, clay pipes, flour, sausages, and cotton and woolen goods. Among the buildings is the theater, a library, and the Rathaus. It is famous as the seat of a Protestant college founded in 1531, which has a library of 100,000 volumes. Debreczen became a Protestant town in the seventeenth century and was occupied by a German army in 1849. Population, 1916, 78,843.

DEBS (dĕbz), **Eugene Victor,** labor leader, born in Terre Haute, Ind., Nov. 5, 1855. He received an education in the public schools and became a house painter at the age of sixteen years, but soon after engaged as railroad fireman. He was chosen a member of the State Legislature in 1881, where he was instrumental in securing the enactment of various laws in the interest of labor. The Brotherhood of Locomotive Firemen retained him as secretary and treasurer for fourteen years. Through his efforts the United Order of Railway Employees was formed, and in 1893 he organized the American Railway Union. The latter organization supported the workmen of the Pullman Palace Car Company in the famous strike for higher wages in 1894, and a great railroad strike followed. President Cleveland promptly ordered Federal troops to Chicago to enforce the decrees of the United States court as to the mail service and interstate commerce. Later Debs and several others were indicted and imprisoned six months. The political term, "government by injunction," originated largely from the troubles in Chicago, and was carried into the campaign of 1896, when Debs supported Bryan for President. In 1900, 1904, 1908, and 1912 he was the nominee of the Social Democrat party for President.



EUGENE V. DEBS.

DEBT (dĕt), an obligation, liability, or claim incurred. Debts are either personal, corporate, municipal, county, state, provincial, or national. It is a well-known characteristic of many individuals and the government to draw financial aid from the prospects of future development in commercial enterprises. The total indebtedness of the United States, of all interests combined, though small when compared with that of other nations, is so vast that one is astounded when contemplating future payment. The possibility that individuals or states possess for going into debt is often a source of convenience and advantage, in that by means of it enterprises are developed and the prosperity of a country is affected more or less favorably. The total national indebtedness of the nations has been increasing constantly. In 1793 it aggregated $2,433,250,000, while in 1900 it had reached the enormous sum of $31,201,759,000, an amount wholly incomprehensible. At the beginning of the Civil War, in 1861, the principal of the public debt in the United States was only $64,842,288, while the net receipts amounted to $55,000,000 per annum. The requirement of meeting the expense of the war increased the indebtedness until its greatest height was reached on Aug. 1, 1865, being then $2,756,431,571.

The following is an abstract showing the indebtedness of the principal countries as ascertained in the early part of 1914:

Name of Country.	Total Debt.	Debt Per Capita.
Austria-Hungary	$1,092,863,255	$ 23.07
Brazil	512,213,359	37.83
Canada	253,997,742	39.44
France	5,655,134,825	143.90
Germany	855,963,454	14.21
Great Britain	3,839,620,745	88.33
Italy	2,767,911,949	82.37
Japan	932,445,798	19.43
Mexico	222,658,181	16.32
Russia	4,038,199,722	28.64
Spain	1,829,265,995	98.35
Turkey	458,603,213	18.39
United States	964,435,687	11.11

DECALOGUE (dĕk'å-lŏg), the ten commandments given to Moses on Mount Sinai. They are placed in the Bible before the collection of laws called the Book of the Covenant,

but are also found in Deut. v., 1-21. Christ summed them up in two commandments.

DECAMPS (dę-kän'), **Alexandre Gabriel,** painter, born in Paris, France, March 3, 1803; died Aug. 22, 1860. He received training under several noted masters and chose originality in the style and subjects of treatment. His paintings are notable for depth and richness of tone. He traveled extensively in the East, studying oriental life, and afterward produced many of the scenes with bold fidelity. Several medals were granted to him at the Paris Exposition of 1855. As early as 1839 he was made a chevalier of the Legion of Honor. Among his most important works are "Children Let Out of a Turkish School" and "Defeat of the Cimbri."

DE CANDOLLE (dę-kän-dōl'), **Alphonse Louis Pierre Pyramus,** Swiss botanist, born in Paris, France, Oct. 27, 1806; died April 9, 1893. He was the son of Augustus Pyramus De Candolle (1778-1841). After securing an education, he became a professor of botany in the Academy of Geneva. In 1866 he was elected President of the International Botanical Congress at London, and the next year of the congress that met at Paris. The University of Rostock made him an honorary doctor. He was decorated with the cross of the Legion of Honor and held important offices in several scientific societies. Among his best known writings are "History of Sciences and Scientists," "Introduction to the Study of Botany," "Beginning of Plant Culture," "Introduction to Natural History," and "Theory of Botany." His son, Anne Casimir Pyramus, was born in Geneva, Switzerland, Feb. 26, 1836, and attained eminence as a student of natural science. He published "Productions of Cork," "Dicotyledonous Plants," and "Investigation of Piperaceae."

DECAPODA (dē-kăp'ō-dà), the highest order of crustaceans. The members of this order have five pairs of legs, the first pair being enlarged to form claws, as in the crawfish, lobster, shrimp, and prawn. The term is also applied to one of the classes of cuttlefish. They have eight arms and two tentacles, the latter being longer than the arms and serve to seize their prey, or to moor themselves safely in a stormy sea.

DECAPOLIS (dē-căp'ō-lĭs), a word meaning ten cities, applied to a district of eastern Palestine prior to the second century A. D. The ten cities included in the district comprised Canatha, Damascus, Dion, Gadara, Garasa, Hippos, Pella, Philadelphia, Raphana, and Scythopolis. It is probable that these cities were built by the Romans in 64 B. C. after the conquest of Syria, and received grants of certain commercial privileges.

DECATUR (dē-kā'tēr), a city in Illinois, county seat of Macon County, thirty-seven miles east of Springfield, on the Illinois Central, the Wabash, and other railroads. It occupies a fine site on the Sangamon River. The chief buildings include the courthouse, the public library, and the Millikin University. The manufactures comprise flour, woolen goods, spirituous beverages, ironware, bridges, hominy, engines and boilers, linseed oil, and furniture. It has gas and electric lights, waterworks, pavements, and street railways. The surrounding country is agricultural. It was settled in 1830 and incorporated in 1836. Population, 1910, 31,140.

DECATUR, Stephen, naval officer, born in Sinnepuxent, Md., Jan. 5, 1779; died March 22, 1820. He was the son of Stephen Decatur (1751-1808), an American officer of high rank. His first naval experiences were on board his father's ships, becoming midshipman at nineteen, and he saw service under Commodore John Barry in the frigate *United States.* He served with distinction against the French and later was one of thirty-six lieutenants who were retained for the regular service. He took an active part against Tripoli in 1801-05, in the Mediterranean, as first lieutenant of the *Essex.* Later he commanded the *Enterprise* and took a conspicuous part when the *Philadelphia* was captured by the enemy. He promptly entered the harbor of Tripoli, boarded the *Philadelphia,* and, after setting the ship on fire, escaped to his own vessel under a rain of shot. This was referred to by Admiral Nelson as the "most daring act of the age." In 1804 he was promoted to the rank of captain. When the War of 1812 commenced, he was placed in command of the warship *United States,* and later was awarded two gold medals by Congress for capturing the British frigate *Macedonia.* In 1815 he proceeded to Algeria to punish the Dey for interfering with American merchantmen, and required that country and Tunis to pay damages on account of violating their treaties with the United States. Later he became involved in a duel with Commodore James Barron and was mortally wounded.



STEPHEN DECATUR.

DECCAN (dĕk'kạn), the name applied to a large scope of country in eastern India, particularly to the portion lying between the Kistna and Nerbudda rivers, but also in a general way to the whole country lying south of the Vindhya Mountains. When applied in the latter sense, it includes the Madras presidency, Mysore, Hyderabad, part of Bombay, Travancore, and other dependent states of India.

DECEMBER (dē-sĕm'bēr). See **Month.**

DECEMVIRI (dē-sĕm'vĭ-rī), the term applied to the ten men appointed to systematize and codify the public laws of Rome. With this

end in view, a number of commissioners proceeded to Greece to study the laws of Solon and other celebrated Greek legislators. On their return in 451 B. C., ten patricians secured an appointment to write the laws under the leadership of Appius Claudius. The laws were set on twelve tables of wood in the Forum, and became known as the Laws of the Twelve Tables. This action on the part of Rome was due to the dissatisfaction of the plebians, because the patricians had no written law to direct them.

DECIUS (de'shi-us), **Caius Messius Quintus Traianus,** Emperor of Rome in 249-251. He was born in Pannonia and commanded the troops of Emperor Philip on the Danube. His soldiers revolted in Moesia and compelled him, under threat of death, to proclaim himself emperor. Philip marched against him and was slain in battle near Verona. Decius, in his short reign of two years, persecuted the Christians. He forced Cyprianus, Bishop of Carthage, to leave his see, imprisoned and tortured Origen, and cast the bishops of Antioch and Alexandria in prison. In 251 he conducted an expedition against the Goths, who had invaded Rome, but he and his son fell in battle near the Danube.

DECLARATION (dĕk-lâ-rā'shŭn), the act of declaring, or making known, or publishing an avowal or affirmation. The most important declaration is the one issued by the American colonies, which see. A declaration of war is a formal notice that, by the practice of nations, belligerents are expected to give before hostilities begin. The *Declaration of Rights* is a document which was drawn by Parliament in 1689 and presented to William III, and Mary, when they accepted the crown of England. In this document Parliament announced that the election of members of Parliament shall be free, that Englishmen have the right to carry arms for their own defense, that unusual punishments and excessive fines shall not be inflicted, that public revenues shall not be collected without the consent of Parliament, and that a standing army shall not be raised or maintained in times of peace. Subsequently the *Bill of Rights,* a formal enactment, contained these articles. The *Declaration of Paris* is an instrument signed by the congress of Paris in 1856, which was subsequently accepted by the principal powers. Among the declarations it contained these: Neutral goods, except contraband of war, are not liable to capture under an enemy's flag; privateering should be abolished; the goods of an enemy, except contraband of war, may be covered by a neutral flag; and blockades must be effective in order to be binding.

DECLARATION OF INDEPENDENCE, the solemn declaration that severed the thirteen colonies from Great Britain. At the beginning of the struggle a permanent separation was not contemplated. An independent government was so distasteful to the colonies, aside from New England, that Congress declared against it on July 6, 1775. Subsequent events and the publication of Thomas Paine's "Common Sense" set ablaze the spirit of 1776. The Legislature of Pennsylvania was so pleased with Paine's production that it voted him a grant of $2,500. The Virginia convention instructed its delegates in May, 1776, to propose a resolution of independence. Accordingly Richard Henry Lee offered such a resolution on June 7. The Colonial Congress on June 10 resolved to appoint a committee to prepare a declaration "that the United Colonies are, and of right ought to be, free and independent states." The committee consisted of Thomas Jefferson, John Adams, Benjamin Franklin, Roger Sherman, and Robert R. Livingston. This committee reported a draft of the Declaration on June 28, and on July 2 the colonies were declared free and independent by resolution.

The Declaration of Independence was formally passed July 4, 1776. It was written by Thomas Jefferson and only a few changes were made from the original draft. At that time Congress was in session at the State House in Philadelphia, known as Independence Hall. The old "Liberty Bell" rang out the glad tidings and the beating of drums and firing of cannon followed. John Hancock was the president of the Congress, and the Declaration of Independence was signed by him and the representatives from the different colonies. Charles Carroll (q. v.), of Maryland, was the last survivor of the signers.

DECLINATION (dĕk-lĭ-nā'shŭn), in astronomy, the angular distance of a heavenly body from the celestial equator, measured along a great circle passing through the poles of the heavens and through the center of the body. That is to say, it is the angle which a line drawn from the center of the earth to the heavenly body makes with the plane of the Equator. The place of a star in the heavens is determined by its right ascension and declination, which correspond to the longitude and latitude of the earth's surface. Circles of declination are great circles which pass through the poles and cut the Equator at right angles. Twenty-four of these divide the Equator into arcs of 15° each, known as *hour circles* or *hoary circles. Magnetic declination* refers to the magnetic needle in the compass, and is the variation of the magnetic needle from the true meridian of a place on the earth's surface. The variation may be either east or west of a place, differs at different points, and is not the same at a given locality at different times.

DECOMPOSITION (dē-kŏm-pō-zĭsh'ŭn), in chemistry, the separation of a compound into more simple substances. When the red oxide of mercury is heated, it undergoes decomposition and is resolved into mercury and oxygen. Water, when subjected to a current of voltaic electricity, is decomposed into hydrogen and oxygen. Decomposition in vegetable and animal matters

is due to minute animals or plants, known as *bacteria* and *ferments*. Many decompositions are effected by light, as those of nitric acid and of the silver salts used in photography.

DECORATION DAY (dĕk-ō-rā'shŭn), the day set apart in the United States for commemorating by appropriate exercises the services of fallen soldiers and sailors. The practice originated in the South before the war closed, and for a number of years was observed by individual parties in the North. The widespread custom owes its origin to an official order made by Gen. Logan in 1868, then commander of the Grand Army of the Republic. This order contained the following: "The 30th of May, 1868, is designated for the purpose of strewing with flowers or otherwise decorating the graves of comrades who died in defense of their country during the late rebellion, and whose bodies now lie buried in almost every city, village, hamlet, and churchyard in the land. In this observance no form of ceremony is prescribed, but posts and comrades will in their own way arrange such fitting services and testimonials of respect as circumstances will permit."

The day is usually called Decoration Day, though in some portions of the country the term Memorial Day is used. Different days were observed by the various states for some years, but the 30th of May has been settled upon universally and is a legal holiday in most of the states of the Union. In the South it is commemorated by decorating the graves of those who fought to preserve the Confederacy. Usually the program includes processions, orations, and the floral decoration of the graves. The exercises observed on this day are among the most appropriate and beautiful connected with public events in the history of the United States, and have taken a deep hold upon the people.

DE COSTA, Benjamin Franklin, clergyman, born in Charlestown, Mass., July 10, 1831. He entered the ministry of the Protestant Episcopal Church in 1857, after graduating from the Biblical Institute at Concord, N. H. He was rector of several important charges up to the Civil War, when he entered the Massachusetts infantry as chaplain. Leaving the army in 1863, he engaged in editorial work and miscellaneous writing. Besides contributions to the *Magazine of American History* and the *Christian Times*, he published "Pre-Columbian Discovery of America by the Northmen," "The Rector of Roxburgh," and "The Moabite Stone." He was prominent as a rector of Saint John's Church, New York City, an organizer of temperance societies, and a member of the Huguenot Society of America.

DECOY (dē-koi'), a contrivance to entice wild game into a snare, or lure it to come within the range of a weapon. The decoys used differ according to the game to be secured. Success in the art of alluring depends to a considerable extent upon the close observation of animals and mechanical skill in constructing the contrivances. Wild ducks are attracted by decoys which closely resemble the living animals. They are placed in the water near the shore in such a position that they appear to be swimming. In this way it is possible to allure the ducks to alight, bringing them within gun range of the concealed sportsmen. Other decoys of a similar kind are used to allure geese, brants, and prairie chickens.

DEDHAM (dĕd'ăm), county seat of Norfolk County, Massachusetts, ten miles southwest of Boston, on the Charles River. It is on the New York, New Haven and Hartford Railroad. Among the noteworthy features are the courthouse, the public library, the town hall, the Historical Society building, and several fine churches. The manufactures include pianos, brooms, cigars, woolen goods, and machinery. The first public school supported by a general tax in America was established at Dedham in 1644. Population, 1905, 7,774; in 1910, 9,284.

DEDUCTIVE METHOD (dē-dŭk'tĭv), the mode or process of teaching in which the student is taught to proceed from general truths to particular facts. It proceeds from rules and definitions to particular facts, instead of first investigating particular facts and then forming and applying rules. To illustrate, an explorer who begins at the mouth of a main stream and follows it to its source, then explores its tributaries from their mouths upward, employs the deductive method, which is the reverse of the inductive method. If the explorer were to use the latter, he would trace the various rivulets from their source to the common débouchure, or outlet. In the deductive method the student reaches the smaller through the greater, the special from the general; while in the inductive method the process is reversed, and the greater is reached through the less, the general through the special. Many branches of study are taught by the deductive method, as geometry, in which the theorems form general truths, and are proven by the demonstration of particular propositions. In psychology we have attained to laws of high generality, hence it offers a wide scope for deduction.

DEE, a river of England and Wales, rises in Lake Bala, Merionethshire, and flows by an estuary into the Irish Sea, about 20 miles below Chester. The chief tributaries are the Alwyn and Treveryn, and a canal seven miles long extends from Chester to the estuary. It is about 85 miles long and is connected by canals with the rivers of central England.

DEE, a river of Scotland, rises in the vicinity of Ben Macdhui, and flows into the North Sea at the harbor of Aberdeen. The Geauley is the principal tributary near its source, and farther in its course it receives the Lui and Feugh. Balmoral Castle is on its banks. It is about ninety miles long. Another river of Scotland called Dee rises near the northern boundary

of Kirkcudbrightshire, and after a course of about fifty miles flows into the Solway Firth. About seven miles of its lower course is navigable. It is noted for its fine salmon fisheries.

DEED, an instrument in writing, signed and delivered by the party bound to the donee or purchaser, conveying title to real estate. In some countries it is necessary that the deed be executed under seal, but in others the private seals have been abolished, hence a deed conveying land may or not have a seal, depending upon the state or country where it is executed. In most states it consists of an instrument in writing that has been acknowledged by a notary public or other competent officer, who certifies to it under his seal or official signature. A *warrantee deed* is one in which the party conveying title agrees to defend it against all claimants, while a *quitclaim deed* conveys only what title may be in the party making the deed. A *deed of trust* is similar to a mortgage, the title depending upon the payment of money from the seller to the purchaser. Instruments of this kind, to be valid in some states, must be witnessed by two persons. It is universally required that the wife join the grantor, if he is married, in making the deed, and it must be recorded in the office of the county recorder or register of deeds.

DEEMS, Charles Force, clergyman and educator, born in Baltimore, Md., Dec. 4, 1820; died Nov. 18, 1893. He graduated at Dickinson College in 1839, entered the Methodist Episcopal ministry, and was engaged in pastoral work until 1842. In the latter year he was elected professor of logic in the University of North Carolina, and in 1845 became professor of chemistry in Randolph-Macon College. In 1855 he resumed pastoral work, remaining until his death as pastor of the Church of Strangers in New York City. His close friendship with Cornelius Vanderbilt led to the endowment of the Vanderbilt University in Tennessee. Among his writings are "Chips and Chunks for Every Fireside," "Weight and Wings," and "The Triumph of Peace." He was editor at different times of the *Annals of Southern Methodism, Southern Methodist Episcopal Pulpit,* and *Frank Leslie's Magazine.*

DEER, a family of ruminant mammals, most species of which are distinguished by deciduous branching horns or antlers. The horns are solid structures growing from the frontal bone, with many branches and tines, growing to an enormous size. They appear the second spring and are shed each year. In the *reindeer* both male and female bear horns, while in other species the female is hornless. The horns appearing first consist only of the beams. In the second year a basal branch appears, the following year a second branch, and in successive years a greater or smaller number of subdivisions grow from the main beam. Each year's growth is at first covered with a sensitive skin or velvet, which later dries and peels off, and a bony ridge is formed on the antlers just above the base of attachment to the frontal bone. The *water deer* of China and the *musk deer* have no horns. There are no deer in Australia and only a few species are found in Africa, though antelopes take their place, but they are widely distributed in many portions of the other continents and some of the islands. The smallest of the family include the Indian *muntjacks,* while the largest are the *moose* or *true elk.* Among the species common to the colder latitudes are the *reindeer, elk, caribou,* and *moose,* while in the temperate and warmer regions are found the *fallow deer, stag, roebuck, sambo deer,* and *muntjack.* The *red deer* of Europe is a fine animal, of which the female is known as the *hind* and the male as the *stag,* the latter having large antlers.

The deer family has sharp hoofs with a cleft between and the feet have two toes. In most species the ears are large and the hair is crisp



RED DEER OF EUROPE.

and thick. They vary in color, though they are mostly brown with reddish tints and white spots. The senses of sight, hearing, and smell are highly developed, thus enabling them to guard against their enemies. Swamps, plains, and forests are alike favorite haunts, though they are seen mostly on hills in the daytime, from which they can take a survey of a large scope and guard against danger. They are fleet of foot, moving with the speed of a race horse when danger confronts them. Their ability to swim is highly developed, the swiftest canoe being alone able to overtake them. The young are born in the spring and kept in a secluded place, which is visited only at odd times in the day by the mother, though it is made her exclusive haunt at night. The food consists of grasses during the warmer season, and of bark, tufts of dried grass, and rushes during the winter. While deer are easily tamed, the

reindeer is the only one of the group that has been completely domesticated.

DEER MOUSE, or **Jumping Mouse,** a class of small mice that resemble the deer in color and in being active. They are about four inches long and have a tail somewhat longer than the body, and the hind legs exceed in length the fore legs. The deer mouse of Canada is a representative species. It is able to jump ten feet at a bound. Other species are distributed in various parts of Mexico and the United States, and all are rodents that show close resemblance to the jerboas.

DEFIANCE (dē-fī'ans), county seat of Defiance County, Ohio, fifty miles southwest of Toledo, at the junction of the Tiffin and Maumee rivers. It is on the Wabash and Erie Canal and on the Wabash and the Baltimore and Ohio railroads. The surrounding country is rich in agriculture. Among the chief buildings are the courthouse, the public library, and Defiance College. The industries include wagon works, woolen mills, machine shops, and cigar factories. It has systems of public lighting, waterworks, and street paving. Population, 1900, 7,579; in 1910, 7,327.

DEFOE (dē-fō'), **Daniel,** author, born in London, England, in 1661; died April 24, 1731. He was the son of James Foe, a butcher, the prefix *De* being added to the name by the author after he reached manhood. He was educated at Newington Green, near London, and at first intended to enter the ministry, but engaged in writing and publishing. Both he and his father were Dissenters, and he was with Monmouth's army and with that of King William in 1688. Later he traveled in Germany, France, and Spain and went through bankruptcy, but afterward discharged his debts by making full payment. His "Treatise Against the Turks" appeared in 1683 and was followed by the satirical poem, "The True-born Englishman," in which he apologized for the king on account of his being a Dutchman, and showed that the English people were the descendants of various races. In 1702 his publication, called "The Shortest Way with Dissenters," aroused the opposition of the House of Commons and it was ordered burned, while a reward was offered for his arrest. He was described as "A middle-sized, spare man, about forty years old, of a brown complexion and dark brown colored hair, but wears a wig, a hooked nose, sharp chin, gray eyes, and a large mole near his mouth." After his arrest he was tried and punished in the pillory, confined, and imprisoned. He wrote "The Hymn to the Pillory" while in prison, and began the publication of a weekly called the *Review,* which he issued regularly for nine years.

The literary vigor and practical talent of Defoe were admired by Lord Godolphin, who employed him on the staff of commissions to bring about the union with Scotland. His visit to Scotland resulted in his "History of the Union." In 1713 he was again confined for publishing objectionable writings and after his release gave up politics. The work by which he is best known, "Robinson Crusoe," was published in 1719. This publication netted him about $5,000 by springing at once into popularity, and has ever since remained an extremely popular and widely read production. Among his other well-known writings are "Colonel Jack," "Memoirs of a Cavalier," "History of the Plague," "Moll Flanders," "Adventures of Roxana," "Everybody's Business is Nobody's Business," and "Captain Singleton." The writings of Defoe are characterized by vigor, clearness, and simplicity. His work in fiction is exceptionally strong on account of possessing the appearance of truth. His "Memoirs of a Cavalier" is regarded one of the best accounts of the civil wars ever written.

DEGREE (dē-grē'), in mathematics, the 360th part of the circumference of a circle. The circumference of every circle is supposed to be divided into 360 equal parts, each being called a *degree.* A degree is divided into sixty minutes, and a minute into sixty seconds. The signs respectively are °, ′, ″. They are written to denote values in this wise: 48° 16′ 12″, meaning forty-eight degrees sixteen minutes and twelve seconds. It is said that an angle contains as many degrees or parts of a degree as there are in the arc subtended by an angle at the center of a circle. We speak of a star as located a given number of degrees above the horizon, or declined a given number of degrees from the Equator. Likewise geographical points are located at certain degrees of latitude or longitude.

A *degree of latitude* is the 360th part of the earth's circumference, north or south of the Equator, while a *degree of longitude* is the 360th part of the earth's circumference measured east or west of a fixed meridian. Since the length of a degree depends upon the magnitude of the circumference of a circle, it is evident that the length of the degrees of longitude is greatest at the Equator and diminishes gradually as we proceed toward the poles, at which a degree equals 0. A degree of longitude at the Equator contains sixty geopraphical or sixty-nine and one-sixth statute miles. Since the earth is flattened at the poles, the degrees of latitude increase slightly as the poles are approached. The term is also applied to a unit of difference in temperature, called a degree of *Fahrenheit,* when the difference between the freezing point and the boiling point of water is divided into 180 parts; *Centigrade,* when it is divided into one hundred parts; and *Reaumur,* when it is divided into eighty parts.

DEGREE, a mark of distinction conferred by colleges and universities on students and others as a testimony of scholarship in the arts or sciences. It is *ordinary,* when conferred upon

students, and *honorary,* when conferred upon members or distinguished strangers as a mark of respect. The value and designation of degrees depend upon the branches covered by college and university courses, though they include mostly the degrees of *bachelor, master,* and *doctor* in the branches of medicine, law, divinity, music, sciences, and arts.

DEHORNING (dē-hôrn'ĭng), the practice of preventing the growth or removing the horns of cattle. It came into vogue in Europe about the middle of the nineteenth century, and is now practiced very extensively in Canada and the United States. Formerly it was held to be cruelty to animals, but actual experience has demonstrated that dehorning is beneficial to cattle, largely for the reason that it renders them more gentle and docile, hence they feed and may be housed to better advantage. However, the horns should be removed when the weather is mild and at a season of the year when flies are not troublesome. Dehorning is done by placing the animal in a substantial stall, in which its head is held firmly in place, and the horns are cut off near the base with a sharp saw. A better way is to prevent the growth of horns as soon as the horn button is beginning to develop on the head of the calf, when about four or five days old, and this may be done by applying caustic potash. It requires only a few minutes to make the application, after which a scab forms, but this falls off in about a month, and the horns never grow on the smooth poll that remains.

DEISM (dē'ĭz'm), the tenets or doctrines of a deist. This system of belief admits the being of a God and acknowledges a number of his perfections, but does not hold to the existence and necessity of a divine revelation.

DEKALB (de-kălb'), a city in Dekalb County, Illinois, in the northern part of the State, about fifty-eight miles west of Chicago. It is on the Chicago Great Western and the Chicago and Northwestern railroads. The chief buildings include the city hall, the public high school, and the Northern Illinois Normal School. Among the manufactures are ironware, furniture, machinery, clothing, shoes, wire, and implements. It was settled in 1838 and incorporated in 1877. Population, 1910, 8,102.

DE KALB, John, Baron, eminent general, born in Alsace, Germany, June 29, 1721; died Aug. 19, 1780. He entered the army of France, rose to the office of brigadier general, and was sent by his government on a secret mission to America in 1768. Silas Deane induced him to join the American forces and he was made major general by Congress. He was sent to reinforce General Lincoln at Charleston in 1780, but did not reach him in ample time. Subsequently he was second commander to General Gates at the Battle of Camden and commanded the troops of Maryland and Delaware. During the resistance of an attack by Cornwallis on Aug. 16, 1780, while leading his forces, he was severely wounded and died three days later. A statue in Annapolis, Md., was erected to his memory.

DE KOVEN (dē-kō'vẹn), **Henry Louis Reginald,** musical composer, born in Middletown, Conn., April 3, 1861. He was taken to Europe when eleven years old and studied at Stuttgart, Paris, and Oxford, and in 1879 graduated from Saint John's College, Oxford. Subsequently he took additional instruction in music at Stuttgart and Frankfort with the view of becoming a professional pianist, but soon after devoted his attention to opera and song writing. Since 1882 he has resided in the United States. Among his best known works are "Robin Hood," "Rob Roy," "Foxy Quiller," "Ask What Thou Wilt," "Three Dragoons," "Don Quixote," and "Maid Marian."

DELACROIX (dẹ-là-krwä'), **Ferdinand Victor Eugène,** painter, born near Paris, France, April 26, 1799; died Aug. 13, 1863. He began study under Pierre Guérin at the age of eighteen, became highly skilled as a painter, and in 1822 exhibited his first work, "Dante and Virgil." Though the coloring was applied at the expense of accurate drawing, it was much praised by critics. Later he produced a large number of excellent paintings, and became recognized as the leader of the Romantic School. Among his productions are "The Massacre of Chios," "The Death of Marcus Aurelius," "The Capture of Constantinople by the Crusaders," "The Farewell of Romeo and Juliet," "Blind Milton Dictating Paradise Lost," and "Liberty Directing the People on the Barricades." On account of his genius he was styled the Victor Hugo of painting.

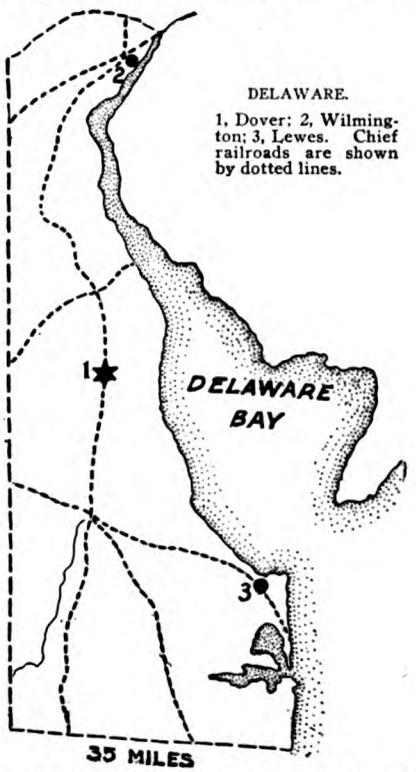
DELAGOA BAY (dĕl-a-gō'ạ), an indentation extending from the Indian Ocean into the coast of Southeastern Africa. It is about forty miles long and from sixteen to twenty miles wide. The Crocodile, Maputa, and other rivers flow into it. At the northern end is the town of Lourenço Marques, one of the chief ports of South Africa. This port is of special importance because it is only 52 miles from the Transvaal and about 350 from Pretoria, with which it is connected by railroads. Delagoa Bay is immediately south of Portuguese South Africa and is under the control of Portugal. The bay is available for vessels of large tonnage, though there are a number of flats and shoals, making navigation quite intricate. In the war between England and the South African republics the bay was a neutral district, and the only one by which the two republics had access to commerce not passing over British territory.

DELAND (dē-lănd'), **Margaretta Wade Campbell,** novelist and poet, born in Allegheny, Pa., Feb. 23, 1857. She attended private schools and studied at Cooper Union, New York City, and engaged in teaching the art of drawing. In 1880 she married L. F. Deland and removed to

Boston. She wrote and published a number of delightful poems and stories. Her books include "Philip and His Wife," "The Wisdom of Fools," "The Story of a Child," "The Common Way," "The Awakening of Helena Richie," and "The Garden, and Other Verses."

DELAROCHE (dę-là-rôsh'), **Hippolyte Paul,** famous painter, born at Paris, France, July 16, 1797; died Nov. 4, 1856. He studied at Paris and first attracted notice in 1824 by his excellent productions, "Saint Vincent de Paul Preaching in the Presence of Louis XIII." and "Joan of Arc Interrogated by Cardinal Beaufort." He is the accredited head of the Eclectic School of art. The treatment accorded his subjects is delicate, the conception picturesque, the coloring pleasing, and the drawing accurate. Among his works are "Princess in the Tower," "Cromwell Contemplating the Corpse of Charles I.," "Bonaparte at Saint Bernard," "Jesus in the Garden of Gethsemane," and "Marie Antoinette before the Revolutionary Tribunal."

DELAWARE (dĕl'à-wâr), a State of the United States, one of the thirteen original states, popularly called the Diamond State. Next to



DELAWARE.

1, Dover; 2, Wilmington; 3, Lewes. Chief railroads are shown by dotted lines.

Rhode Island it is the smallest State in the Union. It is bounded on the north by Pennsylvania, east by the Delaware River, Delaware Bay, and the Atlantic, which separate it from New Jersey, and south and west by Maryland. The greatest length from north to south is 95 miles; greatest width, 35 miles; and area, 2,050 square miles. It has a water surface of 90 square miles. Cape Henlopen, opposite Cape May, N. J., projects into Delaware Bay.

DESCRIPTION. The larger part of the State is located in the Atlantic coastal plain and has an elevation of about 50 feet above sea level, but in the extreme north is a small hilly section. The elevations are not more than 280 feet above the sea and are highest near the boundary of Pennsylvania. Much of the southeastern part is characterized by sandy ridges and the region near Delaware Bay contains a number of extensive marshes. Cypress Swamp, in the extreme southern part, has an area of about 75 square miles.

A number of small rivers supply the interior drainage, most of which flow into Delaware River and Delaware Bay, and several flow toward the southwest into Chesapeake Bay. The soil is generally fertile, with forests in the northern and western parts. It has a temperate climate, with ample rainfall and healthful conditions throughout the year. In the extreme south the average annual temperature is about 56° and in the northern part it is about 52°. The lowest winter temperature is about 17° below zero, though this is rare, and the highest in summer ranges from 90° to 103°. The earliest frosts in autumn occur from the 10th to the 15th of October and plants begin to grow the early part of April. A slightly larger rainfall occurs on the coast than in the section inland, but the average for the State ranges between 42 and 48 inches.

MINERALS. Situated entirely within the Atlantic coastal plain, the State is underlain by rocks of recent geological formation. Kaolin and a good quality of clay are found in the vicinity of Wilmington, where they are quarried for use in manufacturing. In the vicinity of that city are deposits of granite and some feldspar. A good class of glass sand is widely distributed, and marls and bog iron ore deposits occur in many places. The output of granite is the most important.

AGRICULTURE. Nearly 75 per cent. of the surface is utilized in farms and agriculture ranks as the leading industry. Most of the farms are small, ranging from 50 to 75 acres in extent, and comparatively few have more than 160 acres. The soil is tilled with much care and fertilizers are used very extensively. Corn and wheat are the chief cereals and hay takes third rank in the acreage. Stock raising is a secondary industry, but considerable attention is given to the rearing of horses and to dairy farming. Many large orchards are cultivated, the chief products being apples, peaches, and many varieties of small fruits. Vegetables are grown extensively for the Philadelphia and New York markets. The soil and climate are especially adapted to the cultivation of tomatoes, and about 15,000 acres are planted in that product annually.

MANUFACTURING. The location of Delaware gives it good opportunities in the manufacturing industry, especially in that it has extensive transportation facilities and is located near large markets. Iron and steel products comprise the leading manufactures. The leather industry takes rank as the third in the value of the total output. Canning is an important enterprise, both in fruits and vegetables. Other manufactures embrace machinery, railway cars, sailing vessels, cotton and woolen goods, carriages and wagons, and clothing. The oyster and sturgeon fisheries yield large returns, much of the product being canned and cured for export. A small output of wood is obtained for manufacturing in the swampy districts, especially cypress.

TRANSPORTATION. The northern part of the State is crossed from northeast to southwest by two trunk railways, the Pennsylvania and the Baltimore and Ohio, and all parts of the State have convenient railway facilities. The lines in operation aggregate about 400 miles. They include the Philadelphia and Reading, the Queen Anne, and the Baltimore and Delaware railroads. Electric railways are operated to a considerable extent and a canal fourteen miles long connects the Delaware River with Chesapeake Bay. At Lewes, near Cape Henlopen, is an extensive breakwater that cost about $2,225,000. Much of the foreign trade is with Baltimore and New York, though a small per cent. is carried through the port at Wilmington, which is a customs district.

GOVERNMENT. The executive branch is vested in a Governor, who is elected for a term of four years, but is not eligible for a third term. A similar provision governs the election of the Lieutenant Governor, who presides over the Senate. Two houses constitute the legislative department, the Senate of 17 members and the House of Representatives with 35 members. Members of the Senate are chosen for four years and representatives for two years. Six judges constitute the judiciary, one of whom is chief justice and one is chancellor. All the judges are appointed by the Governor for a term of twelve years, subject to confirmation by the Senate. Delaware has one representative in the Lower House of Congress, hence is entitled to three electoral votes.

INHABITANTS. The population is 94 to the square mile. All of the leading religious denominations are represented, including chiefly the Methodist Episcopal, Presbyterian, Baptist, Protestant Episcopal, Roman Catholic and Lutheran. Dover, the capital, is located in the central part of the State. Wilmington, the largest city, is in the northern part, on the Delaware River. Smyrna, New Castle, and Lewes are among the business centers. In 1900 the State had a population of 184,735. This number included a Negro population of 30,687, or 16.6 per cent. Population, 1910, 202,322.

EDUCATION. The system of public schools is based upon a plan adopted in 1875. Support is obtained from direct taxation levied locally and from certain fees and licenses. No normal schools are maintained by the State, but each county has a teachers' institute. Separate schools are maintained for white and colored children. Delaware College, which is open to both sexes, is located at Newark. A college for colored students is maintained at Wilmington and an insane asylum at Farmhurst, and ample provision has been made for the education of the deaf, dumb, and blind.

HISTORY. Delaware was so named from Lord de la Warr, who explored Delaware Bay in 1611. The history of the State is closely linked with the early settlement and development of America. A company of Dutch traders, in 1631, planted a colony near the present site of Lewes. In 1638 a number of Swedes and Finns made the first permanent settlement on the site of Wilmington, where they built Fort Christina. The Swedish claim was under a grant from Sweden. Peter Minuit, a Dutchman, was sent to purchase the land west of the Delaware River, situated between Cape Henlopen and Trenton Falls, from the Indians. The Dutch laid claims to a portion of this district and built Fort Cassimir, and in 1655 secured control of the entire Swedish possessions.

Delaware, together with New York, passed into the hands of England in 1664, and became vested in William Penn by purchase in 1682. In 1693 it was organized as a part of Pennsylvania, but was separated as a distinct colony in 1711. It adopted a constitution as a separate State in 1776, supported the Declaration of Independence in the same year, and in 1787 was the first State to ratify the Federal Constitution. Though holding slaves, it did not secede from the Union at the time of the Civil War, but many of its citizens joined the Confederate army. The Legislature denounced the fourteenth amendment to the Constitution, and an ill feeling prevailed against the negroes for many years after the Civil War. In the development of commerce and industrial enterprises it has made great strides of progress since 1865.

DELAWARE, county seat of Delaware County, Ohio, 23 miles north of Columbus, on the Whitstone (Olentangy) River. It is on the Pennsylvania, the Hocking Valley, and the Cleveland, Cincinnati, Chicago, and Saint Louis railroads. Among the chief buildings are the high school, the courthouse, the public library, and the Ohio Wesleyan University (Methodist). The manufactures embrace woolen goods, earthenware, furniture, machinery, and vehicles. Gas and electric lights, waterworks, telephones, and pavements are among the improvements. It was incorporated in 1827. Population, 1900, 7,940; in 1910, 9,076.

DE LA WARE (dę lá wâr), or **De la Warr, Thomas West, Lord,** colonial Governor of Virginia, born in 1577; died June 7, 1618. Little is

known of his early life. He came to America and governed the colony with success for two years, beginning in 1609, built forts Henry and Charles, and discovered the Delaware River. On account of ill health he returned to England, but was petitioned to rejoin the colony. He died while on his return voyage and his body was lowered in the sea.

DELAWARE BAY, a large extension from the Atlantic Ocean, separating Delaware from New Jersey. It is about 50 miles long and 27 miles wide, and is important as an avenue of commerce. Besides receiving the waters of the Delaware River, it receives the inflow of the Maurice and other streams. The Delaware River is about four miles wide at the mouth, and the bay at the entrance between Cape May and Cape Henlopen has a width of about thirteen miles. The Federal government constructed an extensive breakwater from the latter point, by which the bay, at Lewes, is made an excellent harbor. It facilitates the safe passage of the largest vessels to Philadelphia and other commercial centers.

DELAWARE RIVER, an important river of the United States. It rises in southern New York, forms a part of the boundary between that State and Pennsylvania, the boundary between the latter State and New Jersey, and a portion of the boundary between Delaware and New Jersey. Its general course is southward, though it makes several bold turns, and it discharges into Delaware Bay. It passes through the Kittatinny Mountains near Stroudsburg, Pa., flowing through the Delaware Water Gap, a place remarkable for its beautiful scenery and rock gorges. Trenton and Philadelphia are the most important commercial centers on the river; the former is at the head of navigation and the latter is at the point reached by the largest vessels. The entire length of the river is about 300 miles. Its principal tributaries are the Schuylkill and the Lehigh. Several canals connect it with the Hudson River. The fisheries, consisting principally of shad, are noted for their commercial value.

DELAWARES (dĕl'â-wârz), an Indian tribe of the Algonquin family. They dwelt originally on the Delaware River and were largely under the control of the Five Nations. William Penn bought a large tract of land from them, and important trade relations were maintained with them by the Swedes, Dutch, and English. Their warriors fought at Braddock's defeat, aided in the war with Pontiac, and assisted the Union in the Civil War. Large numbers were converted to Christianity by the Swedes and Moravians, beginning in 1740. Shortly after the Revolution the tribe emigrated to Ohio, in 1818 to Missouri, in 1829 to Kansas, and in 1868 to Indian Territory (now Oklahoma). The United States granted to them the privileges of citizenship in 1866, divided their money and lands among them, and gave them educational aid. They are well advanced in the industries and professions, own their homes, and fill useful functions in life. At present they number about 1,000. Tammany was among their best known chiefs. His name has been given to an influential political society of New York.

DELAWARE WATER GAP, a narrow gorge in the course of the Delaware River, near Stroudsburg, Pa., on the borders of New Jersey and Pennsylvania. It is a low gap in the Kittatinny Range of the Appalachian Mountains, which rise in abrupt cliffs a height of 1,400 feet above the water. The region has been converted into a popular summer resort and is reached by rail from New York and Philadelphia.

DELBRÜCK (del'brük), **Hans,** statesman and historical writer, born in Bergen, Germany, Nov. 11, 1848. He studied at Heidelberg, Greifswald, and Bonn, and subsequently served in the War of 1870-71. In 1874 he became teacher of Prince Waldemar of Prussia, was elected to the house of delegates in 1882, and to the Reichstag in 1885. He was prosecuted by the government in 1899 for criticising the expulsion of the Danes from Schleswig-Holstein. He is the author of numerous valuable works on history and government, and published the *Prussian Year-Book* and the *Political Weekly.* His books include "Frederick, Napoleon, Moltke," "The Old and New Strategy," "The Prussian War and the Burgundian War," and "The History of the Art of War."

DELBRÜCK, Martin, statesman, born in Berlin, Germany, April 16, 1817; died in 1903. After receiving a liberal education, he practiced law at Halle and became assistant minister of finance. He was made director of commerce and industry in 1859. The successful commercial treaty negotiated by him in 1864 between Prussia, Italy, France, Belgium, and England led to his election as president of the federal chancery. His active efforts aided greatly in organizing the German Empire in 1871, for which he prepared the constitution. He remained an active member of the Reichstag until 1880, when he retired. His efficient and valued service to the empire place him in the front rank of European statesmen of his time. He supported free trade as against the protective policy of Bismarck.

DELCASSÉ (dĕl-kà-sā'), **Théophile,** statesman, born in Pamiers, France, in 1852. He studied in his native town and in Paris, and entered the government service. In 1894 he was appointed undersecretary and minister of the colonies, and served as foreign minister in several cabinets. He represented the French government in settling the differences between that country and England in regard to the occupation of Fashoda. In 1899 he served as a mediator between Spain and the United States, took part in the negotiations that followed the Boxer uprising in China in 1900, and successfully promoted a treaty between France and

Great Britain in 1904. He was made a member of the Legion of Honor in 1887.

DELFT (dĕlft), a city of Holland, on the Schie River, about six miles southeast of The Hague. It is important as a commercial center, being situated on a number of railways and intersected by numerous canals. A Gothic church, called the Oude Kerk, dates from the 15th century. Another Gothic church, the Nieuwe Kerk, has a tower 375 feet high and contains 500 bells. William I. of Orange was assassinated in the Prinsenhof, which now serves as a museum. Among the educational institutions is a polytechnical school with an attendance of 700 students. The manufactures include delftware, a celebrated kind of earthenware, carpets, ammunition, soap, and cotton and woolen goods. Electric lights, waterworks, and extensive electric railway lines are among the public utilities. Population, 1917, 34,234.

DELHI (dĕl'hĭ), a city in the Punjab district of India, on the Jumna River, about 830 miles northwest of Calcutta. Solid stone walls secure three sides, through which entrance to the city is effected by ten gates, the other side being protected by the water front. The site of the city is on a high eminence, being clean and healthful, and it has important railroad connections with the principal commercial centers of India and Southern Asia. The former extent of this metropolis is marked by vast ruins of gardens, pavilions, palaces, and mausoleums. Among the noteworthy buildings is the celebrated Shah Jehan palace, commenced in 1631, located in the eastern part of the city. It has a length of 3,200 feet and a breadth of 1,600 feet. Its carvings and decorations are among the finest in the world. The Great Mosque, or Jamma Musjid, is a famous structure after the Byzantine-Arabic style, erected in the 17th century by Emperor Shah Jehan. Another structure of note is the Minar, built in the 13th century, containing pillars 48 feet in diameter at the bottom and 10 feet at the top, with a height of 240 feet. Numerous inscriptions from the Koran and fine fresco work adorn the winding staircases and the walls. The city has been improved greatly within recent decades. It has broad streets, electric lights, and street railways, and is noted as an extensive wheat market. Its bazaars are famous for trading in fabrics, precious stones, and gold and silver work. A public school system is maintained and a government college, founded in 1792, constitutes a center of higher learning. It has a number of Protestant churches, government buildings, and numerous Eastern places of worship.

Delhi was formerly the largest city of Hindustan and for some years was the capital of the Afghans, but subsequently became a part of the Mongol Empire. In 1803 it was made a part of the territory of the British, who have controlled it since that time, except for a brief period during the Sepoy mutiny of 1857. More than one-half of the population are Hindus. Population, 1916, 239,468.

DELIRIUM TREMENS (dĕ-lĭr'ĭ-ŭm trē'-mĕnz), a derangement of the mind attended by extreme nervous agitation and hallucinations, due chiefly to the excessive use of alcoholic liquors. The disease is most prevalent among spasmodic drunkards, the principal symptoms being delirium and trembling. The former is constantly present, while the latter is not perceptible in many instances. At certain stages the sufferer is impressed by seeming to see frightful and extraordinary objects, during which he suffers great fear and mental agitation, which put him in a state of extreme terror. Total abstinence, rest, and wholesome nourishment are the chief requirements in the immediate treatment.

DE LONG (dē lŏng'), **George Washington,** explorer, born in New York City, Aug. 22, 1844; died in Siberia, Asia, Oct. 30, 1881. After securing an education in the public schools of Brooklyn, he was appointed midshipman in 1861, and in 1865 graduated at the United States Military Academy. He became master in 1868, and was promoted to the rank of lieutenant commander in 1879. James Gordon Bennett purchased and fitted out the *Jeannette* for a polar exploration in 1879, equipping it for a three years' Arctic voyage. De Long became commander of this vessel and sailed from San Francisco, July 8, 1879, by way of Bering Strait, in search of the North Pole. After cruising through the polar seas, the vessel was crushed by ice and sunk on June 13, 1881. In October of the same year De Long with some of his party perished on the banks of the Lena River, in Siberia.

DELOS (dē'lŏs), the smallest island of the Cyclades, in the Grecian Archipelago, with an area of about twelve square miles. The surface is a rugged mass of granite, and near its center the rocky peak of Mount Cynthus rises to a height of 350 feet above sea level. The island is celebrated in the song, myth, and history of Greece. Myths make it the scene of the birth of Apollo and Artemis, and, though once a floating mass, it was fixed to the bottom of the sea by Zeus that it might become celebrated by the birth of these noted personages. It was the scene of a festival to Apollo, at which the Greeks from many nations gathered. In 477 B. C. the Confederacy of Delos was formed with Athens at its head, the name being derived from the meeting of its deputies at the temple of Apollo, in which the treasures of the confederation were stored. Delos became a commercial center after the fall of Corinth in 146 B. C., and was famed for its favorite markets and fine harbors. Excellent palm groves grew in its public places, and brazen vessels abounded in vast numbers. In the year 87 B. C. it was laid waste by the Mithridatic War. At present brushwood is quite common

and small fields of corn are cultivated by the natives.

DELPHI (dĕl'fī), a celebrated town of ancient Greece, in the territory of Phocis, noted principally on account of the most important temple and oracle of Apollo. Its location was about six miles from the Corinthian Gulf, hemmed in on the north by the wall-like cliffs of Mount Parnassus, on the south by Mount Cirphis, and on the east by smaller ridges. The Plistus flowed from east to west and drained the region of its surplus waters. The site of the ancient town is occupied at present by the village of Castri. The main point of interest still remains distinguishable, though it was somewhat altered by an earthquake in 1870.

Delphi was noted as the meeting place of the Amphictyonic Council and near it the Pythian games were held. The celebrated oracles were delivered by a priestess, who occupied a tripod over an opening in the ground, from which came intoxicating vapors accompanied by the inspiration of the Delphian god. The replies that came from the oracle were quite obscure and dual in meaning, but served in the regulation and support of the political, civil, and religious autonomy of the Greeks. These oracles grew in fame from the 9th century B. C. until they were abolished, long after the Christian era, by Emperor Theodosius. The temple of Apollo was destroyed, but rebuilt, and added to at various times. The last structure was built in the 5th century B. C., which was the most beautiful and magnificent, costing 300 talents, about $575,000. In it were statues by the great sculptors of Greece, and it was decorated by paintings of the foremost masters of the Grecian art. In the times of Pliny, Delphi contained more than 3,000 statues, and a golden cast of Apollo stood within the temple. It was plundered at various times, but principally by Nero and Constantine.

DELPHOS (dĕl'fŏs), a city of Ohio, in Allen County, fifteen miles northwest of Lima, on the Pennsylvania, the Toledo, Saint Louis and Western, and other railroads. It is finely located on the Miami and Erie Canal and is surrounded by a farming section. Mineral oil is obtained in the vicinity. The manufactures include lumber products, machinery, and farming implements. It has a system of waterworks, electric lights, and several fine school buildings. The first settlement on its site was made in 1834 and it was incorporated in 1851. Population, 1900, 4,517; in 1910, 5,038.

DELSARTE (dĕl-särt'), **François Alexandre,** teacher of elocution, born in Solesmes, France, Dec. 19, 1811; died July 19, 1871. His early study was for the stage, but he devoted himself to instruction in elocution on account of a failure of his voice. He studied to found and elaborate a system by which to reduce human expression to a science. After years of careful application he perfected his system of physical culture, known as the Delsarte System. Singular success made him the center of a school and caused him to be the recipient of many honors.

DELSARTE SYSTEM, the name applied to a method of general physical culture now highly popular in America and Europe. It has been adopted in the schools of many cities, in colleges, and in private institutions, and is largely employed in regular courses of instruction. The originator, François A. Delsarte, asserted that every outward manifestation is the expression of an inner state. He classed the head as the *mental* organ, the trunk as the *emotional* organ, and the limbs as the *primary vital* organs. The mental movements proceed toward the center, the normal around the center, and the vital from the center. In general the laws of force, rhythm, direction, reaction, succession, velocity, and opposition should govern bodily movements. The influence of systematic application has been efficient in developing the high quality of orators, dramatists, and elocutionists, giving them a fine quality of vocal utterance, gesture, and expression in accordance with the higher art of elocution. Besides the effect upon physical development, it has had a wholesome influence upon delivery and expression.

DELTA (dĕl'tà), the name of the Greek letter which corresponds to the letter D. The term was applied to the deposits of silt at the



DELTA OF THE NILE.

mouth of the Nile, on account of its resemblance to that letter. Since then the same name has been given to the alluvial tracts deposited by many of the great rivers, the waters of which flow into the sea by two or more branches. Deltas occur only where the mouth of a river is sheltered from the ocean and the tides and oceanic currents are weak, or in inland lakes and seas where the movement of tides and ocean currents are entirely absent. The delta of the Mississippi is the largest in America. It has an area of 12,300 square miles, two-thirds of which is permanently above water, while the remaining portion is a sea marsh. It begins a short distance south of the confluence of the Red River and extends far into the Gulf of Mexico. The delta of the Nile, which has its outlet into the Mediterranean, has an area of about 9,000 square miles, and is enlarging continually by the sediments deposited annually, which are carried from inundated regions. The

delta of the Ganges and the Brahmaputra, in the Bay of Bengal, exceeds the size of the delta of the Nile. Countless islands have been formed by the deposits and numerous streams wind their way among them in various directions. Among the most important deltas of Europe are those of the Po, Rhone, and Rhine; in Africa, those of the Nile, Zambezi, and Senegal; in Asia, those of the Ganges, Brahmaputra, Euphrates, Indus, Yang-tse-Kiang, and Hwang-ho.

DELUGE (dĕl′ūj), a flood or torrent of water, lava, fire, or melted stone. The name is applied in particular to the flood mentioned in Genesis vi-ix. This remarkable flood was predicted by Noah and is generally credited to the year 2348 B. C. There are various stories of vast floods similar to those mentioned in the Bible. They have been handed down from remote antiquity by various races. In the Hindu story the god Vishnu is represented as giving warning to Prince Satyavarata of an approaching flood, and a vessel was furnished to him in which he and a number of others were saved. The person told of in the Chaldaean history as surviving a flood is Xisuthros, who was carried by a ship over a deluge which is said to have lasted seven days, and he, like Noah, is said to have sent birds out for the purpose of ascertaining whether the flood had subsided. The people who lived prior to the flood of Noah are usually spoken of as antediluvians.

DEMETRIUS (dĕ-mē′trĭ-ŭs) **I.**, called Poliorcetes, King of Macedonia, born about 338 B. C.; died in 283 B. C. He was a son of Antigonus, King of Asia, and fought with his father against Ptolemy of Egypt in Syria. In 307 B. C. he captured Athens from Cassander, and soon after defeated Ptolemy in a naval battle near Cyprus. In 305 B. C. he laid siege to Rhodes, but failed to take the city, and four years later he was defeated at the Battle of Ipsus in Phrygia, causing him to lose his possessions in Greece. He seized the throne of Macedonia in 294 B. C., but was driven out by Pyrrhus and subsequently surrendered to Seleucus, who kept him a prisoner the remainder of his life.

DE MILLE (dĕ mĭl), **James**, author, born at Saint John, New Brunswick, in 1837; died Jan. 28, 1880. He graduated at Brown University in 1854, where he wrote a number of popular college songs. In 1860 he was made professor of classics in Arcadia College, Nova Scotia, and was professor of rhetoric and history at Dalhouse College, Halifax, in 1865-80. His stories of adventure take high rank in the literature of Canada. Among his books are "Lost in the Fog," "The Arkansas Ranger," "The Lady of the Ice," "The American Baron," "The Soldier and the Spy," "The Living Link," "Andy O'Harra," and "A Castle in Spain."

DEMOCRACY (dĕ-mŏk′rȧ-sy), that form of government in which the ruling power or the principle of sovereignty is exercised by the people. It first existed in Greece, where it was advocated by Pericles, and is mentioned in the writings of Herodotus and Aristotle. The result of experience in government for ages has demonstrated that public virtue and good intention are most likely to abound where the people have a voice in making and executing the law. The people as a whole generally mean to be just and do right, and are, as a rule, possessed of a degree of patriotism and public spirit. A pure democracy is impracticable in a large and populous country, but its principles may be embodied in a representative form. In such a government the people are represented by the voters, whose qualifications to vote are generally defined in a constitution called the fundamental law of the nation.

DEMOCRATIC PARTY (dĕm-ō-krăt′ĭk), one of the most important political parties of America, having been in continual existence for more than a hundred years. The rise of such a party in the nation under the new Constitution was natural. In the minds of most Americans the love of individual liberty was native, rather than the desire for a strong central government. Those who felt this need most strongly were naturally quite likely to look with apprehension upon the possibility of its being encroached upon by the Federal government. For this reason they advocated a strict construction of the Constitution and states' rights. These elements of political thought drew the Anti-Federalists together in 1788, and party feeling was further extended by the strong sympathy of many Americans with the French revolution. The view that the government should extend aid to France in its contest with England greatly quickened the public pulse. Thomas Jefferson put himself at the head of the party drawn together by agreement in these views and led the opposition to the Federalists. The party became known as the Democratic-Republican, which is still its official title. Its members were commonly called Republicans before Monroe's administration and since then most commonly Democrats.

The party was in opposition to the administration from its origin in 1792 to 1801, and from the first was strongest in the Southern States. With the election of Jefferson in 1800 it came into power. Among the chief tenets of the party was belief in the freedom of speech, of the press, of religion, of politics; in economical government, popular rule, hospitality to immigrants, and the avoidance of foreign complications. The Federalist party went out of existence after the War of 1812 and the Democratic party came into the chief possession of the field. Later questions regarding commercial revenues, free trade, national banks, and other nationalizing measures divided the party and caused the organization of the Whigs. In 1829 Andrew Jackson led a new element into the party

and gave to it the popular character under an enlargement of suffrage. From this time it won every presidential election but two until 1860, when it was divided regarding the slavery question. The Southern leaders advocated slavery, while the Northern portion favored preserving the Union, thus making it possible for the newly organized Republican party to elect its President.

Among the important measures obtained during the Democratic administrations may be named legislation favorable to agricultural interests; the purchase of Louisiana, Florida, and the Gadsden tract; and the enlargement of the commercial influence of the nation. It promulgated the Monroe Doctrine. The Democratic party carried the nation through the War of 1812 and the Mexican War, secured the annexation of Texas, discontinued the United States bank, widened civil service reform, and established the Federal reserve banks. Its differences from the Republicans at present are those relating to a tariff revenue, those in opposition to a large standing army, those relating to conquests in foreign countries, and the organization of the national system of finance. It advocates the election of United States senators by a direct vote, strict adherence to the merit system in civil service, an opposing policy to trusts controlling productions and prices, and favors public ownership of various institutions of public utility. The presidents elected by the party, or representing Democratic views, include Thomas Jefferson, James Madison, James Monroe, John Quincy Adams, Andrew Jackson, Martin Van Buren, James K. Polk, Franklin Pierce, James Buchanan, Grover Cleveland, and Woodrow Wilson. They represent administrations which cover a total of 64 years.

DEMOCRITUS (de-mŏc'ri-tus), illustrious Greek philosopher, born in Thrace about 460 B. C.; died about 361. Little is known of his life, though it is certain that he was the most learned thinker of his age and possessed a high reputation for moral worth. His style was praised by Cicero and imitated by Pyrrho. Most of his mathematical, musical, and physical works extant were collected by Mullach, a German writer of Berlin, in 1843. He advocated the mechanical or atomical theory of Leucippus, his teacher. He assumed that particles or atoms constitute the elementary ground of nature, and that these are indivisible and in eternal motion. While he admitted the presence of law in nature, he did not acknowledge that of design. His writings contain noble thoughts concerning order, law, justice, and the duties of rulers. He looked upon an inward peace of heart and conscience as the highest good, and regarded it the end and aim of all virtuous endeavor.

DEMON (dē'mŏn), a name applied anciently to a spirit or immaterial being of supernatural powers, supposed to hold a middle place between men and the celestial deities. The ancient Greeks regarded demons in the same light that Christians look upon angels, but the name is now applied to an evil spirit or a fiend. Evil spirits are termed demons in the New Testament, but in making translations the name has come to be displaced by the word *devil*. *Demonology*, that branch of the science of religion which relates to demons, is obscured in the treatises of old writers in that the sources of information are related wholly to the civilized nations, instead of at least in part to the primitive and barbarous tribes. Ideas of demons still prevail to some extent even in civilized life, as is evident by the so-called spirit manifestations of modern times.

DE MONTS (dẹh môn), **Pierre du Gast, Sieur,** Viceroy of New France. He was a wealthy Huguenot and was commissioned to settle and rule the region of North America extending from Cape May to Quebec. In 1604 he settled a colony in Arcadia, near the present borders of Maine and New Brunswick, which he removed the next year to Port Royal, now Annapolis, Nova Scotia. Early the next autumn he returned to France, leaving Champlain and Pont-Greve to explore the country. The colony was abandoned in 1607, and the following year settlements were begun at Quebec and Montreal. However, the fortune of De Monts was so reduced that he was compelled to abandon his scheme of further colonization.

DEMOSTHENES (dē-mŏs'thē-nēz), famous orator of ancient Greece, born about 382 B. C.; died by his own hand in 322. He was the son of a wealthy sword cutler of Athens, who died early, leaving the care of his children and fortune to three guardians, but they greatly abused their trust. At the age of seventeen Demosthenes conducted a suit against them himself and gained his cause, though much of his wealth had been lost. He was nervous, had an impediment in his speech, a tuneless and harsh voice, and ungraceful action. For the purpose of overcoming these defects and strengthening his lungs, he exercised much personal care and exertion. By climbing steep hills his lungs were strengthened, and his voice was cultured by reciting and declaiming on the shores of the sea amid the sounds of roaring waves. His gestures were improved by studying effects before a mirror, and his delivery was improved under the instruction of Satyrus. By means of studious attention, close application, and prolonged exertion he was able to partially overcome feebleness of health and to lay a foundation for skilled oratory and large personal influence. His resolution was early fixed to master the law and politics of his country, for which purpose he labored with a perseverance almost unparalleled. For some time he busied himself as a logographer or speech writer, and by means of this occupation he secured sufficient means to devote the remainder of his life to politics.

Demosthenes appeared in public affairs at

about the age of twenty-eight years, from which time until his death the history of Athens is largely linked with the story of his own life. The Grecian states had sunk into divided districts and had become weak. Their weakness and unorganized condition led Philip of Macedon to encroach upon their common liberties. Demosthenes spent the first ten years of his public life in warning his countrymen against the dangers of division and urged them to unite their forces against the common enemy. His celebrated speeches known as the *Olynthiacs* were delivered when Philip made his attack on the state of Olynthus, and these were followed by his great *Philippics* against Philip himself. He was present to witness the Battle of Chaeronea, in which the Athenians and Boetians were defeated and Grecian liberty was crushed. His next endeavor was to cause a general rising against the Macedonians, but his countrymen were slow in heeding his instruction, and were shortly after obliged to sue for peace.

Demosthenes escaped with difficulty from falling into the hands of the conqueror. His famous oration, *On the Crown,* delivered in 330, was a defense of his whole political life. He was imprisoned in 324 on a charge of having received a bribe from one of Alexander's generals and was condemned, but found safety by escaping into exile. It is thought that the charge was unfounded and instigated by his political enemies, led by Aeschines, the opposing orator of Demosthenes. Shortly after the death of Alexander he was recalled to lead an attempt to secure freedom from the Macedonians, but the scheme proved unsuccessful and the army of Athens was crushed in the Battle of Crannon by Antipater. He fled and sought safety in the temple of Poseidon, in the island of Calauria, but poisoned himself to escape arrest. Modern scholars consider the character of Demosthenes almost spotless. He is pronounced the most perfect of orators by Cicero, and his ability in oratory ranks as high as that of Homer in poetry. His speech was vigorous, concise, and natural, and under his leadership Greek prose attained a degree of perfection never before reached. There are sixty-one orations extant that are attributed to him, though some of these are probably not genuine.

DEMURRER (dē-mûr'rẽr), in law, a suspension of the proceedings in a cause until some point is determined by the court. A demurrer is a plea filed to a petition, answer, or reply, and raises a question as to the sufficiency of the case as stated by the opposite party, or some particular part thereof. Only questions of law are raised by a demurrer, which are tried by the court. When a demurrer is sustained, the effect is to lay the pleadings demurred to out of the case, unless the petition is so amended as to avoid grounds on which the court sustains the demurrer.

DENARIUS (dē-nā'rĭ-ŭs), a silver coin used by the Romans. Originally it contained ten and later sixteen of the monetary denomination called *as,* which was a small copper or bronze coin. It had a monetary value equal to about fourteen cents of the money used in Canada and the United States. The gold *denarius* was equivalent to twenty-five silver *denarii.*

DENIS (dĕn'ĭs), **Saint,** the traditional apostle of France and first bishop of Paris. He was sent from Rome about 250 A. D. to preach the gospel to the Gauls and after some detentions reached Paris, where he caused numerous conversions. He and two other Christians were ordered before the Roman governor and tortured to renounce their faith, and, refusing to do so, they were beheaded about 290. The three bodies were recovered from the Seine, where they had been thrown, by a Christian woman, and were buried. On the site of their graves King Dagobert founded Saint Denis abbey, in 636, a noble Gothic structure. Saint Denis, the town where it is located, is situated about six miles north of Paris. The kings and many rulers of France, beginning with Hugh Capet, were buried here, besides some of the earlier sovereigns. In the revolution of 1793 many of the tombs were rifled and destroyed.

DENISON (dĕn'ĭ-s'n), a city of Texas, in Grayson County, situated near the northern boundary of the State. It is on the Saint Louis and San Francisco, the Missouri, Kansas and Texas, the Texas and Pacific, and other railroads. The noteworthy features include the Washington School, the public library, and the Saint Xavier's Academy. Among the manufactures are ice, ironware, canned goods, earthenware, and machinery. It has systems of electric lighting, sewerage, waterworks, and street pavements. The vicinity was settled in 1872 and the city was chartered in 1891. Population, 1900, 11,807; in 1910, 13,632.

DENMARK (dĕn'märk), a kingdom in the northwestern part of Europe, including the peninsula of Jutland and an archipelago lying east, and comprising among others the islands of Laaland, Zealand, Falster, Fünen, Samsö, Lessö, Langeland, Aerö, Bornholm, and Moen. It is bounded on the north and west by the North Sea; east by the Cattegat, the Sound, and the Baltic Sea; and on the west by Germany. A part of the northern shore is on the Skager-Rak. The area, including the Faroe Islands and the islands of the Baltic Sea, is 15,592 square miles. Nearly the entire country is surrounded by the sea, the peninsula of Jutland being connected with the continent by a narrow neck of land which is less than forty miles wide.

DESCRIPTION. The North Sea washes the northwestern coast, which is low and cut up by bays, but the eastern coast is slightly more elevated and indented by a series of fjords. Limfjord, in the northern part of Jutland, extends across the peninsula from the Cattegat to the North Sea. The interior of Jutland is crossed

by a ridge of hills, extending from the southern frontier to the Limfjord, and forming the watershed between the Cattegat and the North Sea. Guden Aa, the largest river of Denmark, has a length of 100 miles and flows into the Cattegat. About eighty per cent. of the soil is productive, the surface having no elevations higher than 600 feet above sea level. The coast is largely uninhabitable on account of drift sands that form a narrow line of unproductive flats called klitter.

Formerly Denmark had extensive forests of pine and fir, but these trees are now confined chiefly to cultivated lands. The fir was the prevailing tree in former ages, but now the oak and the beech are the most numerous. Other trees in the forests include the aspen, ash, elm, birch, willow, and pine, the last mentioned having been planted to some extent in the marshy and sandy districts. At Copenhagen the mean temperature is about 60° in summer and 32° in winter, and the islands have a somewhat milder climate than that of Jutland. Mists are frequent in summer and heavy rains occur in autumn. Aquatic birds are numerous, and salmon, oysters, and herring abound in the waters off the coast. The climatic conditions are temperate and favorable to health and commercial activity, owing largely to the modifying influence of sea breezes.

AGRICULTURE. Much of the land is divided into small holdings and the system of tenure is largely peasant proprietorship. The importance of agriculture is constantly increasing, owing to the remarkable care and skill exercised in maintaining fertility and redeeming waste and unproductive lands. Dairy farming is the chief source of profit; the production of milk, butter, and cheese greatly exceeds the home consumption of these products. The coöperative plan is used in fostering the dairy industry as well as some departments of general farming. Oats, rye, barley, and wheat are the principal crops. Potatoes and beet roots are grown extensively. The culture of fruits and small gardening receive much attention. Cattle are raised chiefly for dairying purposes. Other live stock grown extensively include sheep, horses, and swine.

MANUFACTURING. Denmark has few mineral deposits, hence its manufacturing enterprises are conducted chiefly on a small scale. Salt, gypsum, and coal are found to a limited extent, though the output of the last mentioned is not sufficient to supply the demand of the industries. Copenhagen is the chief manufacturing center and is noted for its output of porcelain, locomotives, and spirituous liquors. Other manufactures include sugar, pottery, cotton and woolen fabrics, boilers, leather goods, and machinery. Iron smelting is carried on to some extent and fish and oyster canning is a productive industry.

TRANSPORTATION AND COMMERCE. All parts of Denmark have convenient railroad facilities, the lines aggregating about 2,450 miles, most of which are under government ownership and control. The chief commercial centers are located on the coast or navigable streams, or are connected by a network of canals. Telegraph and telephone lines furnish communication facilities with all urban and interurban points. The imports exceed the exports. At present the principal trade is with Germany, Great Britain, the United States, Sweden, and Russia in the order named.

EDUCATION. An excellent system of public schools is maintained. Attendance is compulsory from the age of seven to fourteen years. Practically the entire adult population has been educated in the elements of learning, while a large per cent. has enjoyed the benefits of higher education. The public schools, colleges, and universities under state or municipal control are maintained by public taxation. Schools for instruction in the industries and agricultural arts in the provinces are liberally attended. Hulberg Academy at Sorö and the splendid university of Copenhagen are the chief institutions of higher learning.

INHABITANTS. The people of Denmark are almost exclusively Danes, including only a small per cent. of Jews and others. They are a Teutonic people of the Scandinavian group, and are characterized by a light complexion, blue eyes, and light brown or chestnut hair. Lutheran is the state religion and is the faith of nearly the entire populace, though religious liberty is extended to all. Copenhagen, the capital and largest city, is located on the island of Zealand, on the Sound. Other cities of importance include Aalborg, Aarhuus, Frederiksberg, Odense, Randers, Horsens, and Fredericia. Population, 1906, 2,605,268; in 1911, 2,757,076.

GOVERNMENT. The government is a constitutional monarchy. Legislative authority is vested in the national legislature or *Rigsdag* which is composed of the upper house, or *Landsthing*, and the lower house, or *Folkething*. At present there are 66 members in the Landsthing and 114 deputies in the Folkething. The king is the chief executive and has power to veto bills. He is assisted by the eight ministers of finance, foreign affairs, interior, navy, justice, war, public instruction and worship, and agriculture. The supreme court of twenty-four judges is the highest judiciary, under which justice is administered by the courts of appeal and the officials in rural communities. The nominal war footing is 60,000 men and a standing army of 10,000 men is maintained. Its navy serves only for purposes of coast defense.

COLONIES. The foreign possessions of Denmark embrace Greenland and Iceland. The Danish West Indies were sold to the United States in 1917 for $25,000,000. These colonies have a total area of 87,614 square miles and a population of 121,500. The colonial trade is chiefly with the mother country, and Iceland is the most important colonial possession.

LANGUAGE AND LITERATURE. The Danish language is a branch of the Scandinavian division of the Germanic family of languages, and is closely associated with the Swedish and Norwegian. It was modified by the addition of foreign words in the 11th century, particularly by the introduction of Anglo-Saxon terms, and in the 18th century it was again affected by the extension of German culture. As a whole it may be classed as the most modern of the Scandinavian tongues, being influenced more largely by foreign elements than either the Icelandic or Swedish, and, as a whole, is soft and monotonous, making some of the sounds quite difficult for foreign students to learn. Both the German and Roman characters are used in writing, and the language as a whole had a large modifying influence on the spoken language of Norway, owing to the fact that these countries were long united for governmental purposes. The literature dates from about the 12th century, when the codes of the ancient kings were collected, and many of the songs and ballads of the Scandinavian Sagas were incorporated with local folklore and short poetic productions. Christian Pedersen (1480-1554) translated the New Testament into the Danish at the time of the Reformation, and later published the complete Bible and various treatises written by Luther. Ludvig Holberg (1684-1754) founded the Copenhagen Theater and not only wrote poems and plays, but induced interest in other writers. He may be regarded the founder of the Danish stage, and from his time dates the modern period of Danish literature. His several writings include "Arabian Powder," "The Pewter Statesmen," and "History of Denmark."

Johannes Evald, a writer of considerable note, wrote the national song, "King Christian at the High Mast Stands," and several plays, including "Harlequin Patriot" and "Baldur's Death." Jens Baggesen holds first place among the song writers; Peder Andres Heiberg, among the comic dramatists, and Adam Oehlenschläger (1779-1850) is the most celebrated poet of the last century. The latter adapted many of the interesting details in the mythology of Scandinavia and was the means of bringing the tales of the Edda and the old Norse heroes to the favorable attention of the stage. Adolf Wilhelm Schack Staffeldt (1770-1826) was a contemporary of the former, and took first rank as a lyric poet, while Bernhard Ingemann produced lyric poetry and dramatic works of value.

Hans Christian Andersen ranks among the most famous Danish novelists. His works are largely in the form of short fairy tales, but they are charming to a large class of readers, and have been widely translated. Steen Blicher (died, 1848) is a novelist of note, and his writings are popular because of the beauty with which he describes the customs and characteristics of the people of Jutland. Carl Edvard Brandes (born, 1847), one of the leading recent writers, is the author of "The Remedy" and "Under the Law." Many Danish writers have contributed much of value to the general store of history, astronomy, mathematics, geography, and music.

HISTORY. The history of Denmark dates back to the remote past, when the Saga heroes were noted for daring voyages and deeds of bravery in defense of their country. The oldest inhabitants of which we know were the Cimbri, who joined the Teutons and brought terror to Rome by successive invasions of the provinces of Gaul. Later the Angles, Saxons, and Jutes invaded and conquered England, while the Danes came from Zealand to take their places. Denmark was divided into a large number of small provinces for some time, but, invaded by the Franks and preyed upon by the famous vikings, the people were at last driven to the necessity of forming a united federation as a better means of defense. Later Gorm the Old united the islands and mainland under one dominion and opposed the advance of Christianity begun by the preceding rulers, though he greatly strengthened the general government.

Sweyn, grandson of Gorm the Old, began the conquest of Norway and England, which was accomplished by his son, Canute. His successor lost England in 1042 and Norway in 1047, and his reign was further weakened by the growth of the feudal system, by which the poorer class of people were reduced to serfdom. Norway was conquered by Waldemar I. and Waldemar II. made advances upon Germany, though these were lost under his successor. Queen Margaret ascended the throne in 1387 and established the Union of Calmar ten years later, by which Denmark, Norway, and Sweden became united and were governed with marked success. Under the rule of Christian I. Schleswig and Holstein were united with the other three, but in the time of Christian II. Sweden obtained its independence, and under Frederick I., who ruled ten years, beginning in 1523, Sweden was permanently separated from Denmark, while under Christian IV., Denmark took part in the Thirty Years' War and became involved in two unfortunate wars with Sweden.

The peasants asserted their rights in the latter part of the 17th century, and became free from serfdom at the beginning of the 18th. The British fleet bombarded Copenhagen and destroyed the Spanish fleet April 2, 1801. To avoid an alliance with France a second fleet was sent by the British in 1807, who demanded a defensive alliance or the surrender of the Danish fleet, which resulted in a second bombardment of the capital. Denmark was in the hands of Napoleon from that time until 1814, when it was forced to cede Helgoland to England in exchange for the Danish West Indies, and Norway passed over to Sweden. The German Confederation, headed by Prussia and Aus-

tria, in 1864 obtained the cession of Holstein, Lauenburg, and Schleswig.

Since 1864 the country has enjoyed a period of peace, its people being contented and the national conditions decidedly prosperous. Christian IX. succeeded to the throne in 1863, after the death of Christian VIII., and his reign of 43 years witnessed the material growth of Denmark in national and commercial importance. Through the marriage of his children, the reigning family became related with the sovereigns of many countries of Europe. He died in 1906 and was succeeded by his son, Frederick VIII. The latter died in 1912 and was succeeded by his eldest son, Christian X., who was born Sept. 26, 1870.

DENNISON, William, statesman, born in Cincinnati, Ohio, Nov. 23, 1815; died in Columbus, June 15, 1882. He received a common school education, graduated at Miami College in 1835, was admitted to the bar, and became a member of the Legislature in 1848. In 1860 he was elected Governor of Ohio as a Republican, and later he served two years as Postmaster General, beginning in 1864. In the Civil War he gave active support to the Union, raised a large number of troops, and after the war served as President of the Columbus and Xenia Railroad. His generosity was extended to the Dennison (Denison) University, an institution located at Granville, Ohio. This institution has an annual income of $35,000, is attended by 500 students, and has a library of 10,000 volumes. It is open to the instruction of men only, but is affiliated with Granville Academy and Shepardson College, the latter being a school for women.

DENSITY (dĕn'sĭ-tў), that quality of a body which depends upon the close cohesion of its constituents. It is estimated by the proportion which the bulk bears to the weight. Thus, in two bodies of equal bulk, but differing in weight, the body of greater weight is also of greater density. In two bodies of equal bulk, but of different density, the body which is of greater density contains the proportionately greater amount of matter. In the case of two bodies containing the same quantity of matter, but differing in bulk, the greater density is ascribed to the one which is of less bulk; from this it is seen that the density is directly proportional to the quantity of matter and inversely proportional to the bulk. By a study of astronomy and the laws of gravitation the datum for ascertaining the density of the earth has been secured, which is now assumed to be about five times that of water. Since the surface consists chiefly of oxygen, it has been suggested that the nucleus may be largely of metals. The density of gases, fluids, and solids, as compared with that of water, is their *specific gravity.*

DENTIST (dĕn'tĭst), one engaged in the profession of cleaning, extracting, or repairing the teeth, or replacing them with artificial ones when necessary. Dentistry rose to a profession in the last century. The work now done by a dentist was largely in the hands of physicians prior to that time. The first institution founded in America to further knowledge in this profession is the College of Dental Surgery, Baltimore, which was chartered in 1839. Since then other excellent schools devoted to this branch of knowledge have been founded in the large cities, numerous periodicals are published in its interest, and many dental societies are maintained in Canada and the United States.

In dentistry there are two distinct departments —*mechanical dentistry* and *dental surgery.* The former is concerned with the artificial substitution of lost teeth, while the latter requires an extended medical knowledge of the diseases of the teeth and the general system, and of the effects upon the body resulting from operations on and treatment of the teeth. The chief operations involved in dental surgery are scaling the tartar, regulating displaced and overcrowding teeth, filling the hollows of decaying teeth, and extracting teeth that are decayed to such an extent as not to warrant filling. Crown and bridge work are done largely by the use of gold, but shell crowns and porcelain are used to some extent. Tin and platinum were employed for filling broken or decayed teeth in the early history of dentistry, but now *amalgams* have come into general use. They are made by a combination of one or more metals with mercury.

DENVER (dĕn'vĕr), an important city of the United States, capital of Colorado. It is situated at the junction of Cherry Creek and the South Platte River, 1,025 miles west of Chicago and 1,456 east of San Francisco. It is the converging center of many trunk railways, which afford transportation facilities in all directions, and has an extensive system of urban and interurban electric lines. Among the principal railroads are the Union Pacific, the Denver and Rio Grande, the Missouri Pacific, the Chicago, Burlington and Quincy, the Atchison, Topeka and Sante Fé, the Chicago, Rock Island and Pacific, and the Colorado Southern.

The site is on a level plain located 5,250 feet above the level of the sea and about twelve miles from the foothills of the Rocky Mountains. It is noted as a healthful city, owing to its clear air and dry climate, and is a favorite center for the residence of retired and wealthy people. The atmosphere is remarkable for its clearness, owing to which many of the prominent mountain peaks may be discerned in clear weather, though located seventy miles and more from the city.

Denver is divided by Cherry Creek and the South Platte River into three natural divisions. North Denver is located west and north of the South Platte River, between that river and Cherry Creek is West Denver, and East Denver, the larger part of the city, is situated east of these streams. City Park, in the eastern part of the city, has an area of 320 acres. It is adorned with flowers and shrubbery, has fine

statuary and zoölogical gardens, and is beautified by many lakes and driveways. The entire park system consists of twelve public parks, including Congress, Lincoln, Jefferson, and Highland parks. In the field of education it occupies a high position, having a fine school system and many charitable and higher institutions of learning. These include Denver University (Methodist), Baptist Female College, College of the Sacred Heart (Roman Catholic), Wolfe Hall (Episcopal), and a number of medical, theological, and manual training schools. The hospitals and sanitariums are adequate to the demand and are well-managed institutions. A public library of about 100,000 volumes is maintained by the city, and in addition may be mentioned the State library and a number of others supported by societies and institutions of learning.

Denver owes its commercial importance largely to its favorable location in the proximity of productive iron, lead, silver, gold, coal, and copper mines. These natural products make the city important as a smelting center. About one-fourth of the manufactured products come from the smelting and refining works. Those of next importance are the machine shops, flouring mills, breweries, railroad car shops and foundries. The city is noted as a live-stock market and has a large jobbing and wholesaling trade, especially in dry goods and groceries. The architecture is substantial and includes many large buildings, such as the Tabor Opera House, the Equitable Building, the Denver Club, and the Brown Palace Hotel.

The first settlement in the vicinity of Denver was made in 1858. It was named in honor of Gen. J. W. Denver, at that time Governor of Kansas, of which Colorado was a part. The two villages, Auraria, west of Cherry Creek, and Saint Charles, east of Cherry Creek, were united in 1859 and incorporated, but the incorporation of Denver properly dates from 1861, when it received its charter from the Territory of Colorado. In 1867 it became the capital of the Territory. South Denver was annexed in 1894. Denver was the county seat of Arapahoe County until 1902, when its government was reorganized and it became the city and county of Denver. It has had a remarkable growth since 1870, when it had a population of 4,759. Population, 1900, 133,859; in 1910, 213,381.

DENVER, University of, an educational institution at Denver, Colo. It was founded in 1864 as the Colorado Seminary, but was reorganized in 1880, when the present name was adopted. The university comprises a preparatory school and seven colleges, the latter including a college of liberal arts, the Iliff School of Theology, a graduate school, the Denver and Gross College of Medicine, the Colorado College of Dental Surgery, a college of music, and the Denver College of Law. Three of its twelve buildings are in the heart of Denver and the others are in University Park, a suburb of the city. The university has a library of 42,500 volumes, a faculty of eighty professors and instructors, and an enrollment of 1,650.

DE PAUW UNIVERSITY, an educational institution located at Greencastle, Ind. It was organized by the Methodist Episcopal Church in 1837 under the name of Indiana Asbury University, but changed to the present name on account of an endowment of $1,500,000 given by W. C. De Pauw. The campus comprises about 150 acres and the annual income is $96,000. It has an advanced curriculum, in which elective studies and courses are permitted. The faculty consists of thirty instructors, and the attendance is about 925 students. It has a library of 55,000 volumes. The alumni number more than 2,000.

DEPEW (dē-pū'), **Chauncey Mitchell,** orator and railroad official, born in Peekskill, N. Y., April 23, 1834. He graduated from Yale in 1856, studied law, was admitted to the bar, and began to practice in Peekskill. He served in the State Legislature in 1861-62, and in 1863 was elected Secretary of State. Subsequently he held other offices, but resigned to resume the practice of law, and in 1875 became general counsel for the entire Vanderbilt system of railways. He was chosen second vice president of the New York Central and Hudson River Railroad in 1882, three years later became its president, and in 1898 succeeded Cornelius Vanderbilt as president of the entire Vanderbilt system of railroads. He attained a wide reputation as an orator and as an active worker in the interest of the Republican party. In 1899 he was elected a member of the United States Senate and was reëlected in 1905. He is the author of "A Hundred Years of American Commerce."

DE PEYSTER (dę-pīs'tẽr), **John Watts,** author, born in New York City, March 9, 1821; died May 4, 1907. He studied at Columbia University but did not graduate. In 1845 he became a colonel in the State militia, was brevetted major general in 1866, and assisted in organizing the police department of New York City. He wrote a vast number of articles and pamphlets on historical and military subjects, relating to battles both ancient and modern. His books include "Personal and Military History of Philip Kearny," "The Dutch at the North Pole," and "Life of Field Marshal Torstenson."

DE QUINCEY (dē kwĭn'sĭ), **Thomas,** noted writer, born in Manchester, England, Aug. 15, 1785; died Dec. 8, 1859. He was the son of a linen merchant, who died while quite young and left an estate to his widow, the income of which was valued at $8,000 per year. Thomas received his education at Bath and Oxford, and was noted for his ability to speak readily the Greek at fifteen. While at the university he acquired the opium habit, which clung to him long after. On leaving college he resided at the Lakes, where he met Coleridge, Southey,

and Wordsworth. He returned to London in 1821 and became associated with Lamb, Knight, Hazlitt, and other men of note and learning. A persistent student of German literature, he translated from Richter and Lessing, and induced interest in the works of Kant, Schelling, and Fichte. His writings are pervaded by humor and distinguished by originality. Perhaps no magazine writer of the last century holds a higher place in English literature than he, and no one could write with greater imaginative grandeur. Faultless in style and interesting in detail, his essays have held their place well among readers. His writings include articles in the *London Magazine* and other periodicals. Among his books are "Confessions of An Opium-Eater," "The English Mail Coach," "Letters to a Young Man," "Logic of Political Economy," and a production entitled "Joan of Arc."

DERBY (dĕr'bĭ), a city in New Haven County, Connecticut, ten miles west of New Haven, at the junction of the Housatonic and Naugatuck rivers. It is on the New York, New Haven and Hartford Railroad and several electric lines. The noteworthy features include the public library, the town hall, the Housatonic Dam, and several schools. It has manufactures of cotton goods, furniture, machinery, and earthenware. The first settlement was made in 1646, when it was known as Paugassett, and it was incorporated as Derby in 1675. Population, 1900, 7,930; in 1910, 8,991.

DERBY, a city of Derbyshire, England, about 120 miles northwest of London, on the Derwent River. Among the chief buildings are the county hall, a school of art, an infirmary, and numerous churches. The chapel of Saint Mary's is a very old building, and the noted Tower of All Saints is an excellent specimen of architecture with a tower 175 feet high. Numerous railway lines furnish extensive inland connections. It has electric lights and street railways, public parks, and several fine monuments. The manufactures include porcelain, silk and cotton goods, paper, machinery, chemicals, ironware, marble, and spirituous liquors. It is surrounded by an agricultural country, in which fluorspar abounds. A station was built on the site of Derby by the Romans, to whom it was known as *Derventio.* It became a royal borough in the time of Edward the Confessor. The city was the home of Herbert Spencer. Population, 1911, 123,433.

DERBY, Frederick Arthur Stanley, Sixteenth Earl of, statesman, born Jan. 15, 1841. He was educated at Eton University and entered the army in 1858. He was elected to Parliament from Preston in 1865, became Lord of the Admiralty in 1868, and was Financial Secretary for War in 1874-77, when he was made Secretary for the Treasury. Subsequently he was made Secretary of War, later Secretary for the Colonies, and in 1888 became Governor General of Canada, serving until 1893. He rendered efficient service in the various positions, was made a Knight of the Garter, and received many honors from his government and distinguished societies.

DE RESZKE (dẹh rĕsh'kẹ), **Edouard,** opera singer, born in Warsaw, Russia, Dec. 23, 1856. He studied with his brother Jean de Reszke, and made his first appearance in public at the Italiens Theatre in Paris in 1876. Soon after he joined a company and made a number of tours of the world. He sang about four years with the Royal Italian Opera Company in London, and was with the Metropolitan Opera Company of New York City about ten years. He is regarded one of the greatest dramatic bassos of the present century.

DE RESZKE, Jean, tenor singer, born in Warsaw, Russia, Jan. 14, 1852. He began singing in the cathedral at the age of twelve years, entered upon the study of law, but took up the study of music. In 1874 he made his first appearance in Venice, Italy, where he sang as a baritone, but did not meet with success. He retired from the stage soon after and studied two years, and in 1879 began to sing at Madrid, Spain, in the rôle of a tenor. His success was assured and he attained much popularity as an artistic singer and actor. For many years he took a leading part with the Metropolitan Opera House Company of New York City.

DERRICK (dĕr'rĭk), an apparatus for lifting and transporting heavy weights, such as stone in a quarry. It consists of a tall mast fastened on a pin, on which it may revolve, and is anchored by ropes extending from the top to the ground. A boom is hinged near the bottom of the mast, so constructed that the upper end may be raised or lowered by suitable rope tackle, which works through blocks fastened respectively near the outer end of the boom and near the top of the mast. At the foot of the mast is a system of wheels, with which the tackle block is attached by a rope, and the weight is moved by turning the mast, which causes the boom to swing around. The traveling crane has displaced the derrick in most manufacturing establishments.

DERVISH (dĕr'vĭsh), a Mohammedan devotee, who takes a vow of poverty and austerity of life. Numerous different orders are maintained. Some dwell in monasteries, others live as hermits, and some lead a life as wandering mendicants. The dancing dervishes are a class that accustom themselves to spin or whirl around for hours at a time, uttering *Allah,* and making violent motions of the body. After they reach a state of exhaustion, they claim to be inspired and to possess the power of curing diseases and interpreting dreams.

DESAULT (dẹ-zō'), **Pierre Joseph,** surgeon, born at Magny-Vernais, France, in 1744; died June 1, 1795. He studied for the church, but turned his attention to medicine and sur-

gery. In 1782 he was made surgeon major to La Charité and finally became chief surgeon to the Hotel Dieu in Paris. In connection with the latter he instituted a clinical school which attracted a large number of students. He wrote many works on surgery and introduced numerous improvements into his profession, especially in the treatment of fractures and ligature of arteries.

DESCARTES (dā-kärt'), **René,** philosopher and mathematician, born near Tours, France, March 31, 1596; died in Stockholm, Sweden, Feb. 11, 1650. He was educated at the Jesuit College of La Flèche, where he was distinguished as an apt student and careful learner. After leaving school, he deprecated most of what he had learned, and began to pursue a course of original investigation, through which he made many new discoveries and attained much useful knowledge. Entering the military service, he participated in the campaigns in Holland and Bavaria, but left the army in 1621 and settled in Holland, where he devoted himself to study. His original investigations were the means of contributing much to the advancement of physics and mathematics. In the latter he made a number of contributions to geometry. His work on philosophy, entitled "Discourse on the Method of Reasoning," attracted much attention. Queen Christiana invited him to Sweden in 1648 to further learning, and the queen herself became his pupil. Owing to the cold winters of the north and the exertion in waiting upon the queen as early as five o'clock, he failed rapidly and died in the Swedish capital. His chief writings, besides the one named, are "Geometry" and "Principles of Philosophy."

DESCENT (dē-sĕnt'), in law, a passing from an ancestor to an heir, a transmission by inheritance or succession. The laws of most countries are founded upon the principle of equal distribution, both of personal and real property, among the heirs in the nearest surviving degree. The three classes of kindreds are direct descendants, ancestors, and collateral relatives; the latter include those who have descended from the same common ancestors. There are two sets of collateral relatives, as well as two sets of ancestors, the *paternal* and the *maternal. Lineal descent* is where property descends directly from father to son and from son to grandson; *collateral descent* is where it proceeds to a brother or sister, nephew or niece, or to other collateral representatives. If an individual dies *intestate,* that is, without relatives or without leaving a will, his property usually escheats to the state.

DESERT (dĕz'ĕrt), a region in which plant and animal life is very scant or entirely absent. Some writers class the regions that are barren from cold or lack of soil as deserts, such as Greenland and the lands of the Arctic and Antarctic zones. However, the name is usually applied to the localities of continents that have a climate quite favorable, but whose barrenness is due to the lack of soil or the supply of moisture. Arid deserts are most extensive in Asia, Africa, and Australia, are almost entirely unknown in Europe, and occupy only a small part of the continents of North and South America. The Sahara Desert, which crosses the north central part of Africa, from the Red Sea to the Atlantic, is the largest arid belt of the world. It extends under different names into Asia, where it is known as the Arabian Desert, the Desert of Gobi, and the Salt Desert. The Kalahari Desert, in South Africa, is bounded by the Orange, Zambezi, and Limpopo rivers. A large part of the interior of Australia is a desert. The Colorado Desert, in California, and the Atacama Desert, in northern Chile, are among the barren regions of North and South America.

Deserts vary considerably in the character of their surface. Some consist chiefly of sand and gravel, which frequently drift to form dunes, and others have a rocky surface. Oases are located in many desert regions owing to the presence of springs, or to the streams that rise from the precipitation of high mountains, irrigating the valleys below. Deserts are due to various causes, such as the direction of prevailing winds, which deprive them of moisture; long distance from the oceans; and isolation through surrounding mountain systems. The soil in many parts of the desert is quite fertile, needing only a supply of moisture to render it productive. See **Arid Region.**

DES MOINES (dę-moin'), the largest river in the State of Iowa. It rises in the southern part of Minnesota, flows in a southeasterly direction, and discharges into the Mississippi about four miles below Keokuk, after a course of 500 miles. Among its principal tributaries are the Raccoon and Boone rivers. It drains a fertile agricultural country. Belts of hard wood timber are on either side in Iowa, and it passes through regions rich in coal and limestone deposits. Among the cities on its banks are Fort Dodge, Des Moines, and Ottumwa. It forms the boundary between Lee County, Iowa, and Missouri.

DES MOINES, the capital and largest city of Iowa, county seat of Polk County, near the geographical center of the State. It is finely situated at the junction of the Des Moines and Raccoon rivers, both of which are crossed by a number of substantial bridges. It is on the Chicago, Rock Island and Pacific, the Chicago Great Western, the Chicago and Northwestern, the Chicago, Milwaukee and Saint Paul, the Wabash, the Chicago, Burlington and Quincy, and other railroads, and has extensive urban and interurban electric railway facilities.

The capitol building, one of the finest in the United States, was erected at a cost of $3,000,000. Other public buildings include the United States Federal Court and Post Office, the State

library, the State historical building, and the city buildings. The new county courthouse, a fine structure of stone, was completed in 1907, and the Auditorium, on Fourth Avenue, has a seating capacity of 3,000. Des Moines is the seat of Drake University, Des Moines College, Highland Park College, several business colleges, and a number of parochial schools. The Iowa State Fair Grounds are located in the eastern part of the city and several fine parks are maintained, including Grandview and Greenwood parks. The State library has about 50,000 volumes, the public library has 30,000 volumes, and several other libraries are maintained by the educational institutions.

Many of the streets are paved substantially with asphalt, brick, and macadam. Water power is obtained by means of a dam across the Des Moines River and the city supply of water is procured from the Raccoon River. Near the State capitol building is a fine soldiers' monument. The chief hotels include the Savery, Kirkwood, Chamberlain, and Victoria. Among the leading business buildings are the Fleming, Hippee, Equitable, and numerous office and wholesale buildings. The surrounding country is agricultural and stock raising, while the river bluffs are rich in coal deposits, giving the city a large volume of raw material for transportation and use in manufacturing enterprises. Among the chief manufacturing establishments are medical and chemical works, flouring mills, furnaces, clothing and cigar factories, typewriter works, canning and packing establishments, and machine shops. It has a large retail and wholesale trade in manufactures and merchandise, and supplies these commodities to retail dealers in many towns and cities of Iowa. Des Moines occupies the site of Fort Des Moines, which constituted a United States garrison in 1832. It was incorporated in 1851 and chartered as a city in 1857. Fort Des Moines, a United States garrison, is located south of the city. Population, 1905, 75,626; in 1915, 105,538.

DESMOULINS (dā-mōō-lăn′), **Benoît Camille,** public man and journalist, born at Guise, France, March 2, 1760; died April 5, 1794. He studied law in Paris, practiced as an advocate, and joined the party of revolutionists. In 1789 he delivered a passionate address which aided in stirring up the people to storm the Bastile on the following day. While at the university as a student, he formed the acquaintance of Robespierre, with whom he acted against the Girondists, but in most of his career he was a devoted follower of Danton. Later he became involved in the proscription of Danton, with who he acted against the Jacobins, but both were arrested and guillotined.

DE SOTO (dē sō′tō), a city in Jefferson County, Missouri, forty-four miles southwest of Saint Louis, on the Saint Louis, Iron Mountain and Southern Railroad. It is situated in a zinc and lead producing region, and is a shipping center of cereals and mineral products. The industries include grain elevators, flouring mills, and machine shops. It has electric lighting, a public high school, and other improvements. Population, 1900, 5,611; in 1910, 4,721.

DE SOTO, Fernando, captain and explorer, born in Estremadura, Spain, about 1496; died May 21, 1542. He descended from an impoverished family of rank, but was favored by a friend named Pedrarias de Avilo with means to pursue his studies at the university. His first voyage was made to Darien in 1519 under the command of a captain, and a second was made to Nicaragua in 1527. In the following year he explored the coast of Guatemala and Yucatan, and in 1532 led 300 volunteers to reinforce Pizarro and assist in conquering Peru. He was given permission to conquer Florida by Charles V., who in the meantime appointed him governor of Cuba. He undertook the conquest of Florida in 1538 with the idea that he would find wealth fully as great as enriched him in Peru.



FERDINAND DE SOTO.

De Soto, with a company of 600 men, anchored in the Bay of Espiritu Santo (now Tampa Bay) on May 25, 1539. Landing safely on the shore, the ships were sent to Cuba, and the explorers entered upon a continuous expedition for nearly four years in search of fortune and fame, ever allured by the reports of the wealth that lay beyond. The march was characterized by difficulties in crossing streams and marshes, and by the harassing onslaughts of the Indians. De Soto's route lay through northern Florida into Georgia, then south toward Mobile, and finally toward the Mississippi. The expedition reached the Washita River, and in the spring the company, greatly lessened in numbers, returned to the Mississippi. De Soto was disappointed by failure and died. To conceal his death from the Indians his body was wrapped in a cloak and lowered into the waters of the Mississippi. Only about one-half of his companions survived. The survivors sailed down the river in boats and safely reached the Mexican city of Panuco.

DES PLAINES RIVER (dę plān′), a river of the United States, rises near Racine, Wis., and after a course of 150 miles joins the Kankakee River to form the Illinois River. The general course is south to Lyons, near Chicago, whence it flows toward the southwest. A low ridge separates its basin from Lake Michigan, and thirteen miles of its lower course is utilized in the Chicago Drainage Canal.

DESSAU (dĕs'sou), a city of Germany, capital of the duchy of Anhalt, eighty miles southwest of Berlin. It is situated in a beautiful valley of the Mulde River, near its junction with the Elbe, and is surrounded by a fertile country. The streets are broad and well improved with substantial paving. Electric and steam railroads furnish ample interurban and general transportation facilities, making it an important commercial center. Among the manufactures are cotton and woolen goods, sugar, carpets, pottery, tobacco products, and machinery. It has a gymnasium, three large libraries, many fine churches, and a number of charitable and educational institutions. In its public places are monuments of Wilhelm Müller, the poet, and Moses Mendelssohn, the philosopher, both of whom were born here. Dessau was the scene of a battle in the Thirty Years' War, in 1626, when Wallenstein defeated Count Mansfield at the bridge over the Elbe. Population, 1905, 55,134; in 1910, 56,606.

DE TOCQUEVILLE (dą tŏk'vĕl), **Alexis,** statesman, born in Paris, France, July 29, 1805; died April 15, 1859. After receiving an education, he was admitted to the legal profession and practiced with success. He visited the United States in 1831 to study the prison system and modes of punishment. On returning to France, he was elected a member of the chamber of deputies, and later served as minister of foreign affairs. Among his writings are "On Democracy in America" and "Old Régime and the Revolution."

DETROIT (dĕ-troit'), the chief city and port of entry in Michigan, county seat of Wayne County, on the Detroit River, opposite the Canadian city of Windsor. It is about 18 miles from Lake Erie, 10 miles from Lake Saint Clair, and 285 miles east of Chicago. The site is on a fine eminence, the streets are well paved and shaded by avenues of trees, and the various portions are connected by a system of electric railway lines. It is the focus of many railways, and has dock facilities for large vessels, giving it extensive conveniences for transportation to the chief cities of America. The railroads include the Wabash, the Grand Trunk, the Lake Shore and Michigan Southern, the Michigan Central, and the Pére Marquette.

The city has a river frontage of nine miles and extends about four miles inland from the river. The area is 30 square miles, and the site rises gradually from the river toward the north. Most of the streets are platted to cross each other at right angles, but are intersected by broad avenues which radiate from a semicircular plot within the city known as Grand Circus. This park is crossed by Woodward Avenue, which divides the city into nearly equal parts, and is the principal business street. It becomes a residence street farther from the center of the city and is connected with Campus Maritus, a fine plot of ground a short distance from the river. Griswold Street is the banking center, Lafayette and Michigan avenues have notable buildings, and Jefferson Avenue and West Fort Street contain many fine residences.

Parks and Buildings. The parks embrace about 1,200 acres and are well distributed in the different parts of the city. Belle Isle Park is located on Belle Isle, an island in the Detroit River, and is one of the finest. It is connected with the city by a substantial iron bridge, has a number of interior lakes and canals, and contains about 700 acres. Palmer Park is located on Woodward Avenue, six miles north of the city hall. Clark and Voigt parks are beautiful grounds. Among the principal buildings are the city hall, in City Hall Square, the Majestic Building, near the city hall, the post office, the county courthouse, the Y. M. C. A. Building, and the Cadillac Hotel. The churches include Saint John's Protestant Episcopal, First Presbyterian, Trinity Protestant Episcopal, Sacred Heart of Mary, Fort Street Presbyterian, Woodward Avenue Baptist, and the Jewish Temple. A fine library is maintained in the Museum of Art, which occupies a commodious building.

Educational. Detroit is noted for its finely graded system of public schools, which are supplemented by a number of higher institutions of learning. Detroit College, a city normal school, Detroit College of Medicine, Detroit College of Law, and Michigan College of Medicine and Surgery are among the higher and professional institutions. The city library has about 200,000 volumes, and books are distributed in several branches for the convenience of reading and reference. Many charitable and benevolent institutions are maintained. It is the seat of the Saint Vincent's Orphan Asylum, Florence Crittenden Home, Protestant Orphan Asylum, Deaconess's Home, and many others.

Commerce. Detroit is favored in the expanse of its commerce and industry by its favorable location on navigable waters and numerous railroads. Among the northern ports it takes second rank in foreign trade, much of which is with Canada. The exports include cereals, live stock, hides, lumber, and machinery. It is favored as a center of wholesaling and ships large quantities of manufactures and merchandise to points in Michigan and adjoining states. Among the leading manufactures are automobiles, furniture, wagons and carriages, matches, chemicals and drugs, steel and iron products, and machinery. It is a slaughtering and packing center and has large establishments for the manufacture of paint and varnish. Large shipments of ore are received from points in northern Michigan and Minnesota, and coal is obtained from the mines of Ohio and Pennsylvania, hence its iron and steel industries have been making marked advancement.

History. The first settlement on the site of Detroit was made by the French in 1701, when

Cadillac, governor of the French territory, built Fort Pontchartrain. It remained a French trading village until 1760, when it was captured by the British. At the close of the French and Indian War, in 1763, it became British territory, and finally passed to the United States in 1796. It was incorporated as a town in 1802, but its charter as a city dates from 1824. In 1805-37 it was the capital of the Territory of Michigan, and remained the capital of the State until 1848, when it was superseded by Lansing. Population, 1904, 317,591; in 1910, 465,766.

DETROIT RIVER, the channel or strait which connects Lake Saint Clair and Lake Erie, by which the waters of the three upper Great Lakes reach the Saint Lawrence. It is about twenty-five miles long, three-fourths of a mile wide, and navigable by the largest vessels. For four months in the year it is ice-bound. Within the river are many islands and much fine scenery. The commerce is very extensive. It was named from the French, the name meaning strait.

DEUCALION (dû-kā'lĭ-ŭn), in Greek mythology, the son of Prometheus, husband of Pyrrha, father of Helen, and ancestor of the Hellenes. By building a ship he was enabled to save himself and his wife from destruction by a flood that Zeus sent upon the earth. After floating for nine days, the ship rested on Mount Parnassus, and the occupants landed safely. An oracle directed them to throw stones behind their backs in order that the loss of mankind might be repaired. On doing so the stones thrown by Deucalion turned to men, and those thrown by Pyrrha to women.

DEUCHER (doik'ĕr), **Adolph,** statesman, born in Steckborn, Switzerland, in 1831. He was carefully educated in his native town and turned his attention to medicine, for which profession he studied at Heidelberg, Zurich, and Vienna. However, he gave more attention to politics than to his profession, and in 1855 became a member of the council of his canton. He was a member of the national council of Switzerland in 1869-73, and was elected president of Switzerland in 1886, to which office he was again elected in 1897. As a statesman he was progressive and favored a policy friendly to education and the encouragement of foreign trade.

DEUTERONOMY (dū-tĕr-ŏn'ô-mў), the fifth book of the Pentateuch and of the Bible. It is thought that Moses himself wrote this part of the Holy Scriptures, with the exception of the last four chapters, in which the closing events in the life of the great lawgiver are narrated. It repeats the laws which had previously been promulgated, hence the name. In it is the history of what passed in the wilderness during about five weeks, from the beginning of the eleventh month to the early part of the twelfth month, in the fortieth year after the Israelites departed from Egypt. Moses recounts in Deuteronomy the events which had taken place in the Israelitic history, and makes comprehensive references to particular phases in the law received at Sinai. The books which precede Deuteronomy are *Genesis, Exodus, Leviticus,* and *Numbers.*

DEUTSCH (doich), **Emanuel Oscar Manahem,** Oriental scholar, born at Neisse, Germany, Oct, 28, 1829; died May 12, 1873. He was of Jewish parentage, studied at the Berlin University, and gave special attention to theology and German literature. The expense of university attendance was borne by himself with funds derived from teaching and writing for magazines. He was offered an appointment in the library of the British Museum in 1855, which he accepted and held for nearly twenty years. Besides attending to the duties of the position, he made use of the treasures in the museum and wrote largely for magazines and other publications. Among his writings are "Articles on the Talmud," 190 pages to the Chambers' "Encyclopaedia," and numerous productions on ancient history. In 1869 he traveled through Northern Asia, and on his return to Europe delivered numerous lectures on Phoenicia. He made a second visit to the East in 1872 and died at Alexandria, Egypt, the following year.

DEVENS (dĕv'ęns), **Charles,** jurist and soldier, born in Charlestown, Mass., April 4, 1820; died Jan. 7, 1891. He graduated at Harvard and studied law at Cambridge, and was elected to the State Senate in 1848. The following year he became United States marshal for the district of Massachusetts. In the capacity of marshal he delivered Thomas Sims, a fugitive slave, to the owner against his own inclination. He rendered efficient service in the Civil War, at Fair Oaks and Richmond, and was brevetted major general for gallantry after the capture of the latter. In 1866 he resumed the practice of law, and in 1873 was appointed justice of the supreme court of Massachusetts. President Hayes made him Attorney-General of the United States, and at the close of the administration he resumed his former position as justice of the Massachusetts supreme court.

DEVIL (dev"l), in theology, the sovereign spirit of evil, corresponding to the *Satan* of the Hebrews and the *Iblis* of the Mohammedans. In the Bible the devil is represented as the evil one and the father of lies. He is regarded a rebel against God, a being who is perfect in every kind of skill and knowledge, which he uses to pervert man and entangle him in the meshes of sin. In the Middle Ages, even as late as the 17th century, the belief in evil spirits was very common. In many instances, when a man of genius had made a scientific discovery or accomplished some extraordinary feat, it was supposed that his mind was assisted by the devil in some mysterious way.

As sovereign of the demons, the devil held a prominent place in the practice of magic and in many of the poetical legends. In the mys-

teries (q. v.) he was often represented on the stage with flaming eyes, hooked nails, cloven hoofs, spreading horns, black complexion, and sulphuric odor. Milton and Klopstock, the former in the character of *Satan,* and the latter in that of *Abbadonna,* introduced the devil as a fallen angel, still somewhat dignified amid the disfigurements of sin. The doctrine of the fathers of the church, founded upon certain passages of the Scriptures, makes him the leader of a rebellion among the angels, the enemy of God, the author and constant promoter of sin, now suffering chastisement for his crimes, and destined to eternal punishment. He is called the prince of this world and regarded the cause of man's fall from grace, yet his power was broken by the work of Christ, hence Christians can rise superior to the might of his influence.

DEVIL FISH, the name of a fish belonging to the ray family, common to the waters of the Atlantic and Pacific coasts. It has a winglike process on each side and the head is truncated in front, giving it a peculiar appearance when moving in the water. Divers dread it as a dangerous inhabitant of the sea.

DEVILS LAKE, a city of North Dakota, in Ramsey County, on the north shore of Devils Lake. This lake is forty miles long, about ten miles wide, and its surface is 1,465 feet above the sea. The water is saline and shallow in many places and the lake has no visible outlet. The city is the county seat of Ramsey County, located on the Great Northern Railway, and is surrounded by a fertile farming country. It has a growing trade in produce and merchandise. Among the chief buildings are a county courthouse, a high school, and several fine churches. Population, 1900, 1,729; in 1910, 5,157.

DEVONIAN (dē-vō′nĭ-ạn), one of the rock systems of the Palaeozoic period, located between the Silurian and Carboniferous systems. It is so named from Devon, England, where its strata were first distinguished from those of the Silurian and Carboniferous by Sir R. Murchison. Geologists usually divide it into three groups, the *Lower,* the *Middle,* and the *Upper,* of which the last mentioned is notably distinguished by the presence of large deposits of old red sandstone. The fossil remains are very abundant, especially those of fishes, and include crustaceans, corals, mollusks, crinoids, and cephalopods. The rocks of this system are especially abundant in the Catskill Mountains of New York, where they approximate a thickness of 2,000 feet. They are distributed in many parts of North America, being found in the Black Hills of South Dakota, in Utah and Nevada, in many sections of the Appalachian Mountains, and in Ontario and other localities of Canada. See **Geology.**

DEVONSHIRE (dĕv′ŭn-shĕr), **Spencer Compton Cavendish, Eighth Duke of,** statesman, born in London, England, July 23, 1833. He studied at Trinity College, Cambridge, where he graduated in 1854, and three years later entered Parliament as a Liberal. In 1863 he was made Lord of the Admiralty and Undersecretary, and held various important offices until 1871, when he was made Chief Secretary for Ireland. In 1880 he declined the premiership, which was accepted by Gladstone, in whose Cabinet he afterward became Secretary of State for War. He opposed the home-rule policy of Gladstone and rose to the dignity of Liberal leader. In 1891 he became eighth Duke of Devonshire and received the Order of the Garter. He was Lord President of the Council in 1895-1903.

DEW (dū), a condensation of moisture from the atmosphere in the form of minute globules upon the surface of certain bodies. On a glass filled with cold water, set out on a warm day, small drops of water form, which are derived entirely from the air. This is caused by the temperature of the air, coming in contact with the cold side, being lowered below the dew point; thus, it deposits the surplus moisture beyond its power of retention. The dew seen on plants and other objects has a similar origin. The earth absorbs more heat during the day than it emits, and at night, when the supply of warmth is cut off, it continues to radiate heat. Objects above the surface of the earth cool more rapidly than the air or the earth, thus resulting in a formation of dew as the air or radiated warmth comes in contact with plants and other objects above the surface. Dew is deposited as hoarfrost when the objects are colder than 32° Fahr.

Dew accumulates much more readily on some objects than on others, because some substances radiate their heat more rapidly than other bodies. The deposit is greater during a clear night than when it is cloudy, for the reason that the earth and air cool more readily when it is clear. The reason that more dew is deposited on a still night than when it is windy is due to the fact that air must remain for some time in contact with cold objects to enable them to lower its temperature and collect its moisture. The amount of dew deposited in warm countries greatly exceeds that of cold regions, and in some regions it is one of the principal sources of moisture for the growth and development of plants. Air is said to have reached its dew point when it contains all the moisture it is capable of holding. The dew deposited is from a comparatively thin stratum of air in the immediate proximity of the cool object. The general precipitations, including rain, snow, and hail, are caused by the cooling of large masses of air.

DE WET (dę-vĕt′), **Christian,** military officer, born in South Africa in 1853. His early life was spent on a farm and his education was in private schools. He took part in the War of 1880-81 between the Transvaal and the British, in which he rendered gallant service as a commissary officer. At the outbreak of the final

war between the two countries, in 1899, he received an important command in the Boer army, and rendered efficient service in several important engagements. In 1902 he evaded capture by the British in an engagement between Lindley and Kroonstad, and fought efficiently until his final surrender to Lord Kitchener. As a commanding officer he had the confidence of his soldiers, but many excellent plans in conducting the war might have been carried out more efficiently had he received the hearty support of the burghers that made up his army. After the war he raised funds in Europe and America for needy Boers. In 1914 he supported the revolt against the British in South Africa.

DEWEY (dū'ĭ), **George,** admiral of the United States navy, born in Montpelier, Vt., Dec. 26, 1837. He entered the Norwich Military Academy at the age of fifteen and two years later the Naval Academy at Annapolis, where he graduated in 1858 in a class of sixty-five, taking rank as fifth in the class. In the Civil War he served in the West Gulf squadron, which came under the command of Admiral Farragut in February, 1862. He attained distinction on account of bravery and efficiency under numerous circumstances, and rendered valuable service in the Battle of New Orleans and two attacks on Fort Fisher. In the early part of 1865 he was made lieutenant commander, and served with the European squadron the first two years after the war. In 1875 he became commander, was advanced to the rank of captain in 1884, having in command the *Dolphin* of the White Squadron, and the next year was transferred to the *Pensacola,* the flagship of the European squadron. He served as commander in several responsible positions in 1888 and, after being made commodore, became the chief of the board of inspection and survey.



GEORGE DEWEY.

In the early part of 1898 he was ordered to sea and given command of the Asiatic squadron, which took an important part in the war with Spain. On May 1, 1898, he entered Manila Bay and destroyed the Spanish fleet without the loss of a man or ship, on account of which he has been named the "Hero of Manila." As soon as the Battle of Manila was reported, President McKinley made him an acting rear admiral. Congress voted resolutions of thanks and passed a bill under which he might receive promotion to the rank of rear admiral. On March 4, 1899, he was made admiral, being the third to hold this highest position in the navy of the United States. A demonstration was given in his honor on Sept. 29, 1899, at New York City, when he returned to the United States. For this occasion many distinguished men were present, the celebrated Dewey Arch was constructed, and the character of the celebration far surpassed any reception ever given in America. Similar receptions were afterward given in Washington and in his native city. In the same year the American people presented him with an excellent residence, as a token of appreciation of his valuable service. He died Jan. 16, 1917.

DEWEY, John, educator, born at Burlington, Vt., Oct. 20, 1859. He was educated at the University of Vermont and at Johns Hopkins University, and held professorships in the universities of Minnesota and Michigan. Later he was professor of philosophy in the University of Chicago, and in 1904 became head of the department of philosophy at Columbia University Subsequently he accepted a similar position at Rome, Italy, in the American College. He contributed extensively to educational and scientific journals, covered a wide field in lecturing, and is the author of several standard publications. His books include "The Critical Theory of Ethics," "Psychology of Number," "Studies in Logical Theory," "The School and Society," and "Leibnitz's Essays Concerning the Human Understanding."

DEWEY, Melvil, author and librarian, born at Adams Center, N. Y., Dec. 10, 1851. He graduated at Amherst College, where he was librarian for two years, and subsequently went to Boston to aid in the organization of the American Library Association, of which he was president a number of years. In 1883 he became chief librarian of Columbia College, and four years later was chosen secretary and treasurer of the University of the State of New York. He promoted the organization of a system of traveling libraries of New York and other states. In 1904 he became State director of libraries in the State of New York. He published "Library School Rules" and "Decimal Classification and Relative Index."

DE WITT (dę vĭt'), **Jan,** famous statesman, born in Dort, Holland, in 1625; died Aug. 20, 1672. He was the son of Jacob De Witt and from him inherited a hatred of the family of William, Prince of Orange, afterward William III. of England. He was given chief command in the war begun against England in 1655, holding that position until its termination. His influence was lost when Louis XIV. of France invaded the Spanish Netherlands in 1672, involving Holland in war. Soon after William of Orange became governor and received an appointment as commander of the Dutch forces. Cornelius De Witt, brother of Jan, had been tried and imprisoned for conspiracy against the life of the stadtholder or governor, when he was visited by Jan De Witt. Tumults arose

among the people on this occasion and both were murdered.

DEXTRIN (dĕks'trĭn), a brownish-white compound found in nature, as in the sap of plants, and formed by the action of heat or acids on starch. It is soluble in water and may be purified by precipitating it with alcohol. Dextrin is used in medicine as a substitute for gum arabic, in calico printing, and in stiffening textiles. It is employed to a large extent on the back of postage stamps.

DHAWALAGIRI (dä'wä-lä-gē'rē), or **Dhaulagiri,** an elevated peak of the Himalaya Mountains, in Nepal. Its height is 26,825 feet, the fourth in height of that great system, being exceeded by mounts Everest, Kinchinjunga, and Shumalari.

DIABASE (dī'ă-bās), a crystalline rock of the igneous group, composed of feldspar, pyroxene, and lime soda. The texture is crystalline throughout and the composition is hard and compact. Feldspar found in diabase is usually formed in bladed crystals, which give the rock a mottled appearance, especially if the grains of pyroxene are coarse. Some specimens have a green color, owing to the presence of olivine. Diabase formations are widely distributed. They occur in the Keweenaw Peninsula of Lake Superior, in the Palisades of the Hudson River, in the Deccan of India, and in several sections of the Scandinavian Peninsula.

DIAGORAS (di-ăg'o-ras), ancient Greek philosopher and poet, surnamed the Atheist, lived about 425 B. C., in the time of Socrates. He turned against the gods of Greece because a wrong done to him went unpunished, and on account of blasphemous speeches was obliged to leave Athens. In making his flight he was shipwrecked and perished. None of his works is now extant.

DIAL (dī'ăl), an instrument for ascertaining the time by means of the shadow of a stile or gnomon, through the agency of the rays of the sun or moon thrown upon a graduated plate or disk. It is certain that the dial is the invention of the Asiatics. When Ahaz went to Damascus in 771 B. C., he saw a beautiful altar and sent plans of it to Jerusalem. On his return an altar was constructed. He set a dial which is mentioned in connection with the cure of his son Hezekiah thirteen years after the death of Ahaz. This is, perhaps, the first dial on record, and is some earlier than the eclipse of the moon observed at Babylonia as recorded by Ptolemy.

Dials were in general use before watches and clocks became common as timekeepers. They are of various construction, either upright, horizontal, or inclined. The common dial has a horizontal plane, or dial plate. The stile, pointing toward the North or South Pole, north or south of the Equator respectively, is adjusted to retain its parallelism to the earth's axis. This form becomes a polar dial at the Equator. The hour lines intersect each other and the stile intersects the plane of the dial at all latitudes, except at or near the Equator. The shadows of the stile or gnomon cast upon the figures of the dial mark the several hours of the day, indicating the sun's distance from the meridian. Similar dials are made to indicate the time of the night by the shadow of the moon or stars. These instruments are not serviceable during cloudy weather.

DIAMETER (dī-ăm'ē-tĕr), a straight line drawn through the center of a circle or sphere, terminating at two opposite points of the circumference. A circle is divided into two equal parts by its diameter, which is its greatest chord. A diameter of a cylindrical body is that of one of its circular sections. The diameter of a body is found by dividing its circumference by 3.1416.

DIAMOND (dī'ă-mŭnd), one of the most valuable and the hardest of precious stones, being the purest form in which carbon is found. Its crystals are cubical in form and most commonly have twelve faces. Diamonds of the finest quality are colorless, perfectly clear, and said to be of the *first water.* Some varieties are green, orange, red, yellow, or blue, these being highly prized, if the tint is decided and equal throughout. It is transparent and translucent, and is so hard that it can be cut only by itself, and will scratch any other substance. When cut and polished, a diamond of the purest water weighing one carat is valued at about $100, and the value increases as the square of the weight in carats is multiplied. Its commercial value is affected by the slightest tinge of color, though blue-colored diamonds are exceedingly rare and have commanded enormous prices.

The annual production of diamonds in South Africa is about 2,750,000 carats, equal to about five-eighths of a ton. The amount realized by the sale of this production is estimated at $18,500,000. However, the output varies greatly from year to year, being greatest in 1901, when the production of the Kimberley fields was sold for $23,144,225. Other productive diamond fields are located in Brazil, Australia, and India, though small quantities are found in various other regions, especially in the Ural Mountains, California, and several other states of the United States. The diamond fields of Brazil were discovered in 1728, and the largest single specimen found there weighed 254 carats. It was sold to the Gaikwar of Baroda for $400,000, and became known as the "Star of the South."

Diamonds are found in the sand and gravel of river, lake, and sea beds, and in diamond-bearing rocks. The stones are separated from the sand and rock by washing; this requires elaborate machinery and a large water supply. The principal uses of diamonds are for polished gems, cutting glass, ornaments, and boring or drilling. Engravers use diamonds as etching points, for which purpose they are cut in vari-

ous forms, the value depending largely upon skill in cutting. Recent experiments tend to show that diamonds may be produced by bringing carbon in contact with fused silicate mineral. It is thought that the African diamonds were formed in this way, since they are found in igneous rock adjacent to carbonaceous shale.

Among the diamonds celebrated in history is the Great Mogul, found in 1550, in Golconda, which weighed 793 carats and was cut to 279 carats. The Austrian is a rose cut diamond weighing 140 carats. The great Russian diamond, now in the scepter of Russia, weighed 193 carats. It was purchased by Count Orloff for $500,000 and presented to Catharine on her birthday in 1772. The Kohinoor, meaning "Mountain of Light," belonged in turn to Shah Jehan, Aurungzebe, Nadir Shah, the Afghan rulers, and afterward to the East Indian Sikh chief, Runjeet Singh. It was surrendered to the Queen of England in 1849 by the last ruler of the Punjab, when the annexation of his dominions to Britain took place. Originally it weighed 800 carats, but was reduced by unskillful artists to 279 carats. It was recut in 1852 and now weighs 103 carats. The Regent or Pitt diamond, now in the Louvre, Paris, weighs 136 carats and is said to be worth $2,500,000. Among the largest diamonds found in South Africa is one that weighed 302 carats and another weighed 3,000 carats.

DIANA (dī-ā'nȧ), a goddess of the Romans, known among the Greeks as Artemis. She was the daughter of Zeus and Leto, the twin sister of Apollo, and the goddess of hunting and chastity, but is sometimes represented as goddess of the moon. Being skillful with the bow, she was able to deal out death and sudden destruction to men and animals, while her amiable disposition caused her to alleviate suffering and to care for the diseased. In statuary she appears as a youthful and slender maiden, her hair gathered in a knot at the back of her well-shaped head, and a figure most graceful in proportions and attitude. The free use of her limbs is allowed for hunting by a short robe, and the bow and quiver bear evidence of her devotion to the chase. The most celebrated statue is that known as the Diana of Versailles, preserved in the Louvre, which was found near Tivoli, and forms a worthy companion to the Apollo Belvedere of the Vatican. In this statue the goddess appears in the act of rescuing a deer from its pursuers and turns to the latter with an angry mien. With one hand she draws an arrow from the quiver, while the other is laid protectingly on the head of the stag.



DIANA

DIANA, Temple of, an architectural structure of Ephesus, in Asia Minor, one of the seven wonders of the world. It was built at public expense under plans made by **Chersiphron** of Cnosus, the chief architect. **Pliny** thought that it required 120 years to complete the building, which was 225 feet wide and 425 feet long, and had 126 columns that were 60 feet high and constructed of Parian marble. These columns were in four rows, two rows of eight columns each across the front and two rows of twenty columns each on the sides, with an additional number set near the main entrance. Herostratus is said to have burned it in 356 B. C., when a part of the temple was destroyed. The Goths plundered it in 262 B. C. Excavations made in 1869 led to a discovery of the site, and a number of sculptures and fragments of the architecture are preserved in the British Museum and other collections.

DIAPHRAGM (dī'ȧ-frăm), the broad, almost circular muscle which separates the cavity of the thorax from that of the abdomen. It is thin and in its center has some fibrous tissue. Because of the constant pressure of the abdominal viscera and muscles, it arches up in the thorax. Through it pass the oesophagus, aorta, thoracic duct, inferior vena cava, and a number of the large nerves. During inspiration it ascends, thus increasing the capacity of the thorax, whose vacuum is filled with air, and in expiration it assumes its former position. Expulsions of air are governed largely by the diaphragm, hence it is a factor in laughing, crying, sneezing, and coughing. Sudden contraction of the diaphragm cause hiccoughing.

DIARBEKIR (dē-ăr'bĕk-ēr), or **Diarbekr,** a city of Asiatic Turkey, capital of the vilyet of Diarbekir, on the Tigris River. Most of the architecture is inferior, constructed chiefly of rough stone or of sun-dried brick, but it has a number of fine bazaars, mosques, and Christian churches. The manufactures consist chiefly of utensils and silk and cotton textiles. Copper is mined in the vicinity. Anciently it was known as Amida. Constantinus fortified it, but it was captured by the Persians in 502 A. D. Population, 1917, 46,500.

DIAS (dē'ȧs), **Bartolemeu,** Portuguese navigator, born about 1445, lost in a storm May 29, 1500. He was of noble birth and had his residence at the court of King John II. An early interest in geography aided in developing his knowledge and ability as an explorer and discoverer. In 1486 he was given command of an expedition that sailed from Portugal to explore the northern coast of Africa. The voyage included a visit to the southern part of Africa, and resulted in claiming that region in the name of the King of Portugal. Later he sailed farther south, discovered the Cape of Good Hope, and

returned to Lisbon in December, 1487, where he was received with enthusiasm. He sailed on a voyage of exploration three years later under Cabral, discoverer of Brazil, but was shipwrecked and the entire crew was lost.

DIATOMS (dī'ă-tŏmz), a family of microscopic plants, widely distributed in nearly all parts of the world. They were first discovered by O. F. Müller near the beginning of the last century, and by 1824 only 49 species were known. It is thought that not less than 9,000 species exist. For some time writers differed as to whether they should be classed with the vegetable or animal kingdom, but from a study of their general structure, and more especially their modes of reproduction, they are now universally classed as plants. The diatoms are common to most fresh and salt waters, and are devoured in large numbers as food by the lower forms of marine animals. When examined by the microscope, it is seen that the cells are solitary, or united into colonies, and each cell has a small shell or covering, which in many species is beautifully ornamented.

DIAZ (dē'äs), **Porfirio,** statesman and general, born in Oaxaca, Mexico, Sept. 15, 1830; died July 2, 1915. He studied law, but soon after joined the Mexican army in the war with the United States, in which he was highly distinguished by faithful service. In 1863 he became military governor of the state of Vera Cruz, holding that position until 1876, in which capacity he reformed civil service and suppressed several insurrections. He was commander of the army against France, was twice obliged to surrender and was sent to France, but escaped and took command of forces that overthrew Maximilian in 1867. When the republic was reëstablished in 1876, Juarez was elected president, but soon died and was succeeded by Lerdo de Tejado. In a revolution Diaz drove the latter from power and was himself proclaimed president by congress, in which office he served from May 5, 1877, to Nov. 30, 1880. His administration was distinguished on account of wholesome tariff and financial legislation, and extensive internal improvements, particularly canal and railroad building. He was again elected president in 1884 and was reëlected successively, practically without opposition, and in 1904 was chosen president for the seventh time. His government was marked by a vigorous policy, civil service reform, commercial growth, and educational advancement, and was admirably suited to the needs and conditions of the republic. Under it the country witnessed marvelous prosperity, and the stability and credit of the nation became assured. He resigned as president in 1911.



PORFIRIO DIAZ.

DICE (dīs), the plural of die, small cubes of bone, ivory, or serpentine stone, used in playing the game of dice. The faces are marked with a different number of points, from one to six, in such a way that the numbers on any two opposite sides count seven. In playing they are shaken and thrown from a box on a table, and the game depends upon the number of points presented by the upper faces. It is thought that the game was first used by the Lydians, and was played quite extensively among the Greeks, Egyptians, and Romans.

DICKENS (dĭk'ẹnz), **Charles,** famous novelist, born at Landport, England, Feb. 7, 1812; died June 9, 1870. He was the son of John Dickens, who was employed in the navy pay department. When Charles was nine years old, his father became reduced to straitened circumstances and was required to live in one of the poorer districts of London, where he was troubled by his creditors. Charles received a somewhat scanty education, was placed in a blacking warehouse, where he did drudgery, and later became clerk in an attorney's office. After a time his father's circumstances became improved and he returned to school, perfecting himself in shorthand for the position of a newspaper reporter. His early engagements were with the *Mirror of Parliament* and the *True Sun,* and in 1835 with the *Morning Chronicle,* in which the first series of the "Sketches by Boz" brought him to public notice. The following year his success was assured by the appearance of "Pickwick Papers," in which the humor and oddities of life are finely represented. Other works soon followed, among them "Oliver Twist," in which the conduct of workhouses was exposed. Soon after followed a denouncement of the cheap boarding schools in "Nicholas Nickleby," and later the weakness of home instruction in "Dombey and Son." After visiting America in 1842, his satirical accounts of American manners and life appeared in "Martin Chuzzlewit" and in "American Notes." Soon after his "Christmas Tales" delighted and attracted the interest of large circles of readers.



CHARLES DICKENS.

Dickens visited Italy in 1845 and on his return assumed editorial management of the *Daily News,* which he soon after gave up to publish

his "Pictures from Italy." He became editor of the *Household Words* in 1850, in which several of his works appeared as serials, among them "A Child's History of England." He ceased its publication in 1859 and started *All the Year Round,* a similar periodical, in which a number of productions appeared, among them "A Tale of Two Cities," "Great Expectations," "Uncommercial Traveler," and "Our Mutual Friend." The last of his works was issued in 1870, entitled "The Mystery of Edwin Drood," but only three numbers appeared before his death at his residence near Rochester. He was buried in Westminster Abbey.

Dickens' works have been read almost universally. His writings deal with life as found among the lower and middle classes of society in his time. They are characterized by a constant flow of spirit, drollery, and pathos. He notices trifles that are unheeded by the ordinary observer and describes his characters so exquisitely that their names have become common phrases and household words. His readers are not only confined to English-speaking people, but are met with among other peoples into whose language his works have been translated. The popularity of Dickens in America was shown by an enthusiastic reception when he visited the United States a second time in 1867. His works not mentioned above include "The Old Curiosity Shop," "The Personal History of David Copperfield, "The Bleak House," "A Christmas Carol," "The Cricket on the Hearth," "The Battle of Life," "Barnaby Rudge," and "Little Dorrit."

DICKINSON, a city of North Dakota, county seat of Stark County, 115 miles west of Bismarck. It is nicely located on the Heart River and the Northern Pacific Railroad. The surrounding country is agricultural and stock raising. It has a number of fine school and county buildings, several churches, and a large trade in produce and merchandise. It is important as a grain shipping point and has a number of large elevators and lumber yards. Population, 1905, 3,188; in 1910, 3,678.

DICKINSON, Anna Elizabeth, orator and authoress, born of Quaker parents at Philadelphia, Pa., Oct. 28, 1842. Her first speech was made against slavery in 1857, before the members of a society of Progressive Friends. Later she spoke on temperance and politics, taught school, and in 1869 secured employment in the United States mint. She spoke in opposition to the election of Lincoln in 1864 and supported Greeley in the canvass of 1872. Her addresses delivered during the Civil War were especially patriotic. She appeared as an orator in many of the states in 1876, going upon the stage soon after, and wrote and acted with moderate success until 1888, when she resumed lecturing. A number of her works have been dramatized. Among her writings are "A Crown of Thorns," "What Answer?" "True to Herself," and "A Ragged Register of People, Places, and Opinions."

DICKINSON, Daniel Steven, statesman, born in Goshen, Conn., Sept. 11, 1800; died April 12, 1866. He began his life work as a clerk in a clothing store, taught school, was admitted to the bar, and settled at Binghamton in 1831. He was chosen United States Senator as a Democrat in 1844, and in 1861 was elected to the office of attorney-general of the State. Later he was district attorney for the southern district of New York and held other responsible positions. As a debater and orator he took high rank, supporting the conservative wing of his party.

DICKINSON, Donald McDonald, known as Don M., jurist and statesman, born in Port Ontario, N. Y., Jan. 17, 1846; died Oct. 15, 1917. He removed to Michigan when twelve years old, was educated in the public schools of Detroit and the University of Michigan, and was admitted to the bar in 1867. He entered politics in 1872 and took an active interest in the success of the Democratic party. President Cleveland appointed him Postmaster-General in 1886. He resumed the practice of law in Detroit at the expiration of his term.

DICKINSON, John, statesman, born in Talbot, Md., Nov. 13, 1732; died Feb. 14, 1808. He studied law in Philadelphia, where he entered upon the practice of that profession. In 1768 he published his celebrated "Letters to the Inhabitants of the British Colony by a Pennsylvania Farmer," in which he advocated the idea that Parliament had no power to tax the colonies. He was the first to use the term, "No taxation without representation." However, he opposed the Declaration of Independence in 1776, urging that the act was premature, and was among a few members of Congress who did not sign that document. He enlisted as a private when the war broke out and was afterward raised to the rank of brigadier general. In 1779 he was elected to Congress from Delaware and the following year to the Delaware Assembly, and afterward was made president of that body. He served as president of the supreme executive council of Pennsylvania from 1782 to 1785. In 1783 he founded Dickinson College at Carlisle, Pa., the second oldest educational institution in the State. It was under Presbyterian control until 1833, when it was transferred to the Methodist Episcopal Church. It has an endowment of $430,000. The buildings and equipments are valued at $500,000 and the library contains 45,500 volumes. The college contains advanced courses in the classics, sciences, and modern languages.

DICKSON (dĭk's'n), **Sir James Robert,** statesman, born at Plymouth, England, in 1832; died in 1901. He was educated at Glasgow, Scotland, and in 1854 removed to Australia, where he was elected to the Queensland House of Assembly in 1872. He held several important

government positions, including that of Treasurer of the colony in several cabinets. In 1889-92 he lived in Europe, but returned to Australia in the latter year and took a prominent part in the government. He was made Premier in 1889, in which position he exercised a wide influence in advocating the establishment of the Commonwealth. In 1900 he was a delegate to London, and on returning to Australia was appointed Minister of Defense of the first federal Cabinet, but he died shortly after the new government was inaugurated.

DICTATOR (dĭk-tā'tĕr), the highest magistrate in the ancient Roman Republic. The dictator was an extraordinary magistrate, endowed with absolute authority, and it lay with the senate when the services of such an officer were necessary. The first dictator was appointed in 501 B. C., nine years after the Tarquins were expelled from Rome. Only those who had been previously consuls were eligible to the position. Originally the office could be filled only by a patrician, but later eligibility was extended to the plebeians. No one could legally hold the office longer than six months, but Sulla and Caesar were dictators for a longer period. The dictator had absolute power without any appeal, and his official acts could not be questioned by the senate. He was prohibited from leaving Italy, could not use the public funds, and was not permitted to ride on horseback without special permission from the people.

DICTIONARY (dĭk'shŭn-ă-rȳ), a book which contains a large list of words in any language, arranged alphabetically, and treated in a systematic order. The equivalent words in another language are usually given, with the spelling, pronunciation, etymology, definition, and other illustrative features. The term is frequently applied to works on special subjects, such as law, medicine, music, biography, etc. Dictionaries of the English language were first published in 1573 by John Baret, in 1616 by John Bullokar, and in 1755 by Dr. Johnson. Noah Webster published the first edition of his dictionary in 1828, and the "American Unabridged Dictionary" by Joseph E. Worcester was published about the same time. The dictionary of Webster is issued at present under a number of titles, including "Webster's International Dictionary" and "Webster's Imperial Dictionary." Among the newer dictionaries are the "Oxford English Dictionary," published in England, in 1888, the "American Encyclopaedic Dictionary" (1888), "The Century Dictionary" (1891), and "The Standard Dictionary" (1895). The last mentioned is among the largest, containing about 320,000 words. It is thought that the earliest German dictionary was published by Hrabanus Maurus, a contemporary of Charlemagne. The most extensive German work is that of Wilhelm Karl Grimm and in the French, that of Maximilien E. Littre.

DIDEROT (dē-d'-rō'), **Denis**, writer and philosopher, born in Champagne, France, Oct. 15, 1713; died July 30, 1784. He was educated for the ministry at the college of his native town. Later he studied at Paris, and, having a dislike for the ministry, he tried the law, but, finding that uncongenial, he became devoted to literature. His allowance was cut off by his father for refusing to become a lawyer or physician, which caused him to be reduced to financial straits and to seek employment as a tutor and writer for booksellers. Among his first works is a translation of the "History of Greece," which brought him the sum of $120. Soon after numerous works appeared that were objectionable to the clergy and the government, resulting in his imprisonment for some time at Vincennes. After gaining liberty, he wrote for the stage, but his productions proved failures. He united with D'Alembert in editing an extensive encyclopaedia. Originally his intention was to prepare it as a translation of foreign works, but later he enlarged it as an original production. In it appeared bold statements relating to public thought and scientific research.

The work on the encyclopaedia occupied the attention of Diderot nearly thirty years. It was, by reason of the special fitness and excellent education of the author, a literary production of much value and completeness, though it met with considerable opposition among some classes, who regarded a number of the articles atheistic. In the latter part of his life he was pressed for want of means and determined to sell his library, thereby providing for his only daughter. Empress Catharine of Russia, having heard of his intention, bought the library with the condition that the author himself should be librarian and receive an annual salary. Soon after he proceeded to Saint Petersburg to thank his benefactress, but on returning his health was impaired, from which he never fully recovered.

DIDO (dī'dō), the traditional founder of Carthage, who flourished about 880 B. C. She was the daughter of the King of Tyre, sister of Pygmalion, and wife of her uncle, Sichaeus, Soon after her brother ascended the throne of Tyre, he murdered Dido's husband, who was a priest of Hercules. Dido escaped with the treasures of Sichaeus, and, accompanied by many Tyrians, landed near the Phoenician colony of Utica in Africa, and built a citadel called Byrsa on a site bought from the Numidian king. The story is told that she purchased a tract of land that could be encompassed with the hide of a bull, and, after the agreement, she cut the hide into small strips and surrounded a large tract of ground, on which the mighty city of Carthage was built. Her untimely death has been assigned by Virgil to the circumstance that Aeneas deserted her and sailed to Italy, thus leaving her passions unrequited. However, it is generally thought that Dido

founded Carthage fully 75 years before the founding of Rome.

DIDYMIUM (dĭ-dĭm'ĭ-ŭm), a metallic element discovered by Mosander in 1842, found chiefly in the mineral cerite. It is closely related to bismuth. Its chemical symbol is Di, and its anatomic weight is 145.4. Chemists have separated it into two elements, *neodymium* and *praseodymium.*

DIEFFENBACH (dē-ĕf'fĕn-bäk), **Johann Friedrich,** surgeon, born at Königsberg, Germany, Feb. 1, 1792; died Nov. 11, 1847. He studied at Bonn and Königsberg, traveled in France, and began a successful practice of surgery in Berlin. In 1840 he was made chief surgeon at the Charity Hospital, where he attained a reputation as an operator. He is the inventor of numerous new instruments and originated methods in forming artificial lips, noses, and eyelids. His methods of treating squinting and stammering have come into extensive use. Among his publications are "The Treatment of the Stammerers," "The Transfusion of Blood into the Veins," "A Treatise on Squinting," and "Methods of Cutting the Cartilage and Muscles."

DIES IRAE (dī'ēz ī'rē), the title given to a Latin hymn whose first line is "Dies irae, dies illa." Its authorship is generally credited to Thomas of Celano, a native of the kingdom of Naples, whose death occurred in 1255. The poem is dedicated to the last judgment, and was first published in Venice in 1250. Many of the eminent scholars of Germany translated it, among them Fichte, Schlegel, and Busenbaum. No religious poem has undergone as many translations in various languages, owing to the difficulty in producing its exquisite religious fervor. Several stanzas were introduced by Sir Walter Scott into his "Lay of the Last Minstrel," the first of which is as follows:

> The day of wrath! that dreadful day,
> When heaven and earth shall pass away.
> What power shall be the sinner's stay?
> How shall he meet that dreadful day?

DIESTERWEG (dēs'tĕr-vâg), **Frederich,** writer and educator, born in Siegen, Germany, Oct. 29, 1790; died at Berlin, July 7, 1866. After studying at the University of Tübingen, he became private teacher in Mannheim. He was elected professor in the secondary school at Worms in 1811, at Frankfort-on-Main in 1813, and director of the normal school at Mörs in 1820. Two years later he secured an election to the superintendency of the schools of Berlin, from which position he was relieved for political reasons in 1850. In 1858 he was elected to the Prussian Diet, where he was active in advocating educational reforms. Among his publications are "Life of Pestalozzi," "School Inspection," and "Text-Book of the German Language."

DIET (dī'ĕt), the name of several political bodies of Europe, corresponding to the Parliament of Great Britain and the Cortes of Spain and Portugal. It is derived from the Latin *dieta,* and signifies a day fixed for the national deliberations of public affairs. In this sense it is used to designate the Reichstag of Germany, the Riksdag of Sweden, the Rigsdag of Denmark, and the Rijksdag of the Netherlands. The word *diet* is frequently applied by English writers to the legislative assemblies of Germany, Austria, and Hungary.

DIET, the food commonly eaten to compensate for the waste of tissue and provide means for the growth and development. See **Food.**

DIFFRACTION (dĭf-frăk'shŭn), in physics, the deflection and decomposition of light, causing the appearances of parallel bands or fringes of prismatic colors. It occurs when light passes by the edges of opaque bodies or through narrow slits, as by the action of a grating of fine lines or bars. A glass screen, commonly called a *diffraction grating,* is used in physical laboratories to illustrate these phenomena. It consists of from 10,000 to 20,000 parallel lines to the square inch ruled on glass, and as the light passes through brilliant spectrum colors result. A diffraction grating made by ruling lines on speculum metal produces a similar effect by reflecting the light from the polished and ruled surface. Such gratings are used in place of the prism in spectroscopic work, and with them it is possible to obtain spectra of wide dispersion. The spectrum given by the grating is called the *normal spectrum,* since in it the distribution of the different wave lengths is uniform. Diffraction gives rise to the play of colors seen in mother-of-pearl and the feathers of some birds.

DIFFUSION (dif-fū'zhŭn), the property possessed by liquids of intermingling with each other when brought in contact. It may be illustrated by placing water colored with blue litmus into a glass jar, and then pouring a small quantity of sulphuric acid, by means of a thistle tube, into the bottom of the jar. The acid will change the blue of the litmus to red wherever they come into contact. If the jar remains in a quiet place, the acid will intermingle with the litmus solution, and after a short time the entire contents of the jar will be red. Diffusion is more rapid where the surfaces of the two liquids are increased, as by placing them in a shallow vessel, or by stirring with some solid object, such as a spoon or a glass rod. Alcohol and water mix readily when placed together in a vessel, but water and mercury or oil and water do not mix, since there is no adhesion between their molecules. This may be illustrated by pouring oil and water into a bottle and shaking thoroughly, after which the two will separate into two distinct layers, the separation being nearly perfect. Diffusion takes place between gases, which may be demonstrated by filling two flasks, one with chlorine and the other with hydrogen, and connecting the two by means of a long tube through

the corks fitted tightly into their necks. There being a difference between the color of chlorine and hydrogen, it is possible to observe the diffusion with the eye as the intermingling takes place.

DIGESTION (dī-jĕs'chŭn), the process by which foods are converted into soluble and diffusible products, capable of being absorbed by the blood. It may be said to begin in the mouth, where the solids are broken into small pieces, moistened with saliva, mixed with air and saliva, and formed into a bolus for swallowing. The saliva, by its active principle known as *ptyalin,* changes some of the starch at once into sugar. The glands of the stomach are excited to activity by the entrance of food, which has been made somewhat alkaline by the saliva and mucus, and the presence of acid lessens or stops the action of the ptyalin. A slight churning process in the stomach thoroughly mixes the ingredients, which are subjected to the action of pepsin, the active principle of the gastric juice. The starches and fats are loosened, the protoplasm is dissolved, and the proteids are converted into peptones. Food is acted upon in the stomach from three to four hours, depending upon its quality and quantity, as well as upon the condition of mind and physical health, both of which exercise a marked influence.

The partly digested food which passes from the stomach through the pylorus into the duodenum is known as *chyme,* and is a grayish liquid and is mixed somewhat with large lumps. By the action of the bile, the pancreatic juice, and the intestinal secretions, in the small intestines, the starches are converted into sugar and the remaining proteids into peptones, and the fats are made into an emulsion, or a soapy substance. The digested food, known as *chyle,* is absorbed by the portal blood vessels and by the lacteals. The contents that pass into the large intestine again become acids, owing to fermentation, and a small amount of cellulose is digested. The absorption of the liquids contained in the fluid mass is an important function of the large intestine.

DIGHTON ROCK (dī'tŭn), a large mass of granite on the east bank of the Taunton River, near Dighton, Mass. It is remarkable for an inscription deeply cut with mysterious characters and has been the subject of much discussion among antiquarians. Mention was made of it by colonists as early as 1730. Some writers have expressed the view that the inscription was made by the Norseman in 1008, while others regard it the product of Indians.

DIJON (dē-zhôn'), the capital of the department of Côte d'Or, France, on a plain near Mount Afrique, 1,915 feet above sea level. It is conveniently located on a number of railroads and electric railways. The noteworthy features include a Gothic cathedral with a spire 300 feet high, dating from the 13th century. Other noted structures are the Church of Saint Michael, the theater, and the university. The public hall was begun in 1366 and served as a palace of the Burgundian dukes. It has an excellent museum, a library with 85,000 volumes, and several institutions of advanced learning. Among the manufactures are hosiery, chemicals, cotton and woolen goods, leather, machinery, and the celebrated Dijon mustard. The Romans knew the city as Dibia. It passed from Burgundy to France in the 5th century, was ruled by counts in the 9th century, and was united to the duchy of Burgundy in 1007. After the death of Charles the Bold it became a French possession. The German army occupied it in 1870. Population, 1916, 78,113.

DIKE (dīk), in geology, a wall of trap or some similar form of igenous rock, which traverses other rocks, and appears to have been produced by the flowing of melted matter into a deep rent or fissure. Dikes differ from veins in being larger, and in their contents having greater uniformity. They frequently project above the surface like a wall, owing to the rocks around them being somewhat softer. In thickness they vary from a few inches to a mile. Dikes that occur between the layers of a sedimentary formation are called *intrusive sheets.* They consist chiefly of basalt and quartz porphyry. Dikes are found in volcanic regions and are widely distributed.

DILEMMA (dī-lĕm'mà), in logic, an argument which contains two or more alternatives, equally conclusive against an opponent which ever alternative he chooses. A person who is confronted by a dilemma must admit one or the other, hence is said to be caught between the horns of a dilemma. The following dilemma may serve to convey a clearer notion than could be formulated in a definition: "If this man were wise, he would not speak irreverently of Scripture in jest; and, if he were good, he would not do so in earnest; but he does it, either in jest or earnest; therefore, he is either not wise, or not good."

DILKE (dĭlk), **Sir Charles Wentworth,** statesman, born at Chelsea, England, Sept. 4, 1843; died Jan. 26, 1911. He studied at Cambridge, was admitted to the bar, and made tours in 1866-77, visiting various parts of Asia, the United States, and Canada. After returning to England, he published a record of his travels under the title "Greater Britain." He was elected to Parliament from Chelsea in 1868, where he allied himself with the Radicals in politics, and was charged with holding republican opinions rather than favoring a constitutional monarchy. He held the office of Undersecretary for Foreign Affairs and was President of the Local Government Board, with a seat in the Cabinet of Gladstone. He was defeated for reëlection to Parliament in 1886 on account of an exposure of the Crawford divorce case, in which he was named as a co-

respondent, and soon after devoted himself largely to travels and literary work. He was returned to Parliament in 1892. Among his publications are "The British Army," "European Politics," "The Eastern Question," "Parliamentary Reform," and "Imperial Defense."

DILLON (dĭl'lŭn), **John,** Irish statesman, born in Blackrock, Ireland, in 1851. He was educated at the Catholic University of Dublin, was elected to Parliament in 1880, and was an active supporter of the Parnellites, on account of which he was suspended along with others of the Parnell party. His resignation in 1883 was followed by a reëlection in 1885, and again the following year. Later he traveled in Australia. After returning to Great Britain, he was arrested on a political charge. His bail was forfeited and he escaped to the United States. He returned in 1891 and declared himself in favor of Mr. Parnell's retirement. Later he was again elected to Parliament and held a conspicuous place among the representatives of Ireland.

DINAPUR (dē'nä-po͝or), a city of British India, in the province of Behar, twelve miles northwest of Patna. It is nicely situated on the Ganges River and a railroad, and has strong fortifications. The surrounding country is fertile, producing cereals and fruits, and the city has a large trade in produce and merchandise. In 1857 it was the scene of a mutiny. Population, 1916, 35,046.

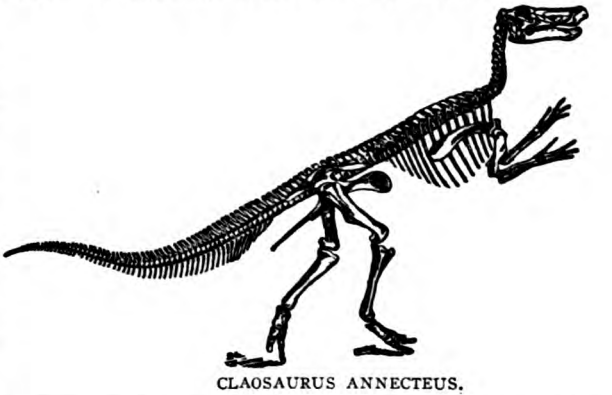
DINARIC ALPS (dē-năr'ĭk), a mountain range in southwestern Austria, trending parallel to the coast of the Adriatic Sea. It forms a connecting line between the western extremity of the Balkan Range and Mount Klech, at the southern extremity of the Julian Alps. The highest peak, Mount Dinara, is 6,010 feet above sea level.

DINGLEY (dĭng'lĭ), **Nelson,** statesman, born in Durham, Me., Feb. 15, 1832; died Jan. 13, 1899. He entered the Waterville College in 1851, and graduated from Dartmouth in 1855. Though admitted to the bar, he did not practice law, but founded the Lewiston *Journal,* becoming its editor. He was elected a member of the Maine Legislature by the Republicans in 1862, 1863, 1864, 1868, and 1873, after which he served as Governor of Maine for two terms, and was a delegate to the national convention in 1876. In 1881 he was elected to Congress to fill a vacancy and the next year for a full term, serving in Congress consecutively until 1899. By his speeches in favor of high protective tariff the way was paved for the McKinley tariff law of 1890. He opposed the enactment of the Wilson law in 1894, and framed the tariff schedule that bears his name, which became a law in 1897. Bates College and Dartmouth granted him honorary degrees on account of ability as a speaker and writer. The value of his service in Congress was generally recognized by his party.

DINGO (dĭŋ'gō), the wild dog of Australia, thought to have originated from a breed of the domestic dog. It is from two to three feet long and about two feet high, and has an appearance somewhat resembling that of a wolf. The color ranges from pale brown to black, usually with tawny markings, the ears are erect, and the tail is bushy. In a wild state it utters a howl like a wolf, but when domesticated it soon learns to bark when placed in company with other dogs. The natives have domesticated the dingo and use it in hunting, but also hunt wild dingoes for their flesh, which they prize as an article of food.

DINORNIS (dī-nôr'nĭs), a genus of extinct birds of the ostrich family, fossil remains of which are found in New Zealand. It is reasonably certain that six species existed and that the largest specimens had a height of from twelve to fourteen feet. They were stupid and indolent, incapable of flying, and subsisted on vegetable food. Fossils are found in the deposits of the post-Pliocene period.

DINOSAURIA (dī-nō-sa'rĭ-à), a group of large fossil reptiles, classed with the extinct lizards. Remains of these animals are found in the Jurassic system of rocks. They resembled the crocodile on the one hand and



CLAOSAURUS ANNECTEUS.

the birds on the other, and most of the species walked on their hind legs. To this group belonged the claosaurus annecteus, a birdlike animal whose body was thirty-five feet long. The smallest of the group were three feet long, while the largest, such as the megalosaurus, attained a length of forty to sixty feet. This animal was carnivorous, feeding on the animals that lived in the haunts it frequented, but the iguanodon was herbivorous.

DINOTHERIUM (dī-nō-thē'rĭ-ŭm), a genus of extinct mammals allied to the modern elephant and the extinct mastodon. Fossil remains are found in the Miocene and Pliocene rocks of Europe, in the region lying between Greece and northern Germany. They had no tusks in the upper jaw, but two tusks projected

downward and slightly backward from the lower jaw. It is thought that these animals did not inhabit America, but they were in Southern Asia, from Asia Minor to India.

DINWIDDIE (dĭn-wĭd'dĭ), **Robert,** colonial Governor of Virginia, born in Scotland about 1690; died in Clifton, England, Aug. 1, 1770. His appointment as Lieutenant Governor of Virginia in 1752 was due to his prompt exposure of frauds committed by the collector of customs in the West Indies. However, his ill temper and avarice made his rule unpopular. The taxation of American colonies was first suggested by him to the British board of trade. No native-born officer in the army was permitted to hold higher rank than captain, which caused Washington to resign from its service. He returned to England with much wealth in 1758, but never accounted for it satisfactorily.

DIOCLETIAN (dī-ŏ-clē'shạn), **Valerius Diocletianus,** Emperor of Rome, born in Dalmatia in 245 A. D.; died in 313. His reign extended from 284 until 305. He was of humble birth, adopted a military career, and served with distinction under emperors Probus and Aurelian. The army proclaimed him emperor after the death of Numerian. He defeated Carinus in 286. The dangers threatening Rome compelled him to divide the government with Maximian, and he appointed Galerius and Constantine as subordinate rulers with the title of Caesar. Each ruler governed a distinct region from different capitals. He resigned in 305, owing to overwork, and retired to Salona, in Dalmatia, where he died.

DIOGENES (dī-ŏj'ẽ-nẽz), celebrated Greek philosopher, born in Asia Minor about 412 B. C.; died near Corinth about 323. He was the son of a money changer in Sinope, and, the two having been detected altering coins, both were required to leave their native city. Diogenes proceeded to Athens with a single attendant, whom he discharged, and later denuded himself of superfluous furniture, dress, and other articles. It is told that he possessed nothing but a cloak, wallet, and a wooden bowl, the latter of which he threw away when he saw a boy drinking from the hollow of his hand. He was attracted to Cynosarges and sought admission as a pupil of this great teacher, which was granted after prolonged entreaty. To render himself capable of enduring the elements, he embraced snow-covered statues in winter and rolled himself in the hot sand in the summer.

On making a voyage to Aegina, Diogenes was captured by pirates and sold in Crete as a slave. His purchaser took him to Corinth to superintend the education of his children, where he soon became famous on account of his learning. Great crowds were attracted by his teaching at the Isthmian games. His fame attracted, among others, Alexander. When that great Grecian sought to reward him for his interest in learning and asked what favor he could render, the reply was that he would beg the prince not to stand between him and the sun. In response Alexander replied, "If I were not Alexander, I would be Diogenes." According to the popular story, Diogenes walked barefooted through the streets of Athens and at night slept in a tub, a large earthen vessel. Some time after his death at Corinth a pillar was erected to his memory.

DIOMEDES (dī-ŏ-mē'dẽz), the son of Mars and Syrene, and King of the Bistones in Thrace. He is celebrated for his mares, which he fed upon human flesh. To obtain possession of these mares was one of the twelve labors of Hercules, who slew Diomedes and fed his body to the mares, after which they became docile. Another Diomedes, son of Tydeus, was a prominent figure in the Trojan War. He was a favorite of Minerva and aided Ulysses in carrying off the Palladium of Troy.

DIONYSIUS (dī-ŏ-nĭsh'ĭ-ŭs), **The Elder,** an ancient tyrant of Syracuse, Sicily, born about 430 B. C.; died in 367. His life was begun as a clerk in a public office, and he first took part in political affairs after the destruction of the Athenian expedition against Syracuse. During the invasion by the Carthaginians he was general in the army of Syracuse, which possessed a republican form of government at that time. He became ruler of Syracuse in the year 405, after the Carthaginian army had been thinned by pestilence. Subsequently he conducted a number of expeditions against the Carthaginians, gaining several victories, and extended his rule over other cities in Sicily. Later he completely crushed the Carthaginians near the walls of Syracuse and directed his efforts against Carthage. His success in war made him one of the most celebrated military men of his time. Besides aspiring to military renown, he sought to obtain poetical glory and wrote several lyrics and tragedies. A number of his productions were hissed at the Olympic games, but a tragic poem gained a prize at Athens. His reign of 38 years is generally described as efficient, leaving at his death a powerful empire and immense military stores.

DIPHTHERIA (dĭf-thē'rĭ-ȧ), a blood disease characterized by a false membrane composed of elastic fibers, found chiefly on the pharynx, tonsils, nostrils, palate, tongue, and gums, and sometimes on the oesophagus. The membrane is of an ashy color and leaves a bleeding surface when detached, often terminating in blood poisoning. It is a disease of all ages, spreads by contagion, and is highly dangerous. It frequently accompanies typhoid fever, croup, and scarlet fever, the chances of recovery in such cases being very doubtful. The fatality has frequently been as high as ninety per cent. in past years, but with the newer modes of treatment it has been materially reduced.

The treatment in diphtheria is both constitutional and local, in which iron, chloride of potash, cinchona bark, and quinine are largely employed, though carbolic acid, glycerin, and chlorine are used more or less extensively. The newer method is to use antitoxin in the treatment. In aggravated cases a tube is employed, through which the patient is enabled to breathe while the soreness and swelling are greatest. Accurate reports made in 1900 show that the mortality has been reduced very largely by the use of this remedy. In 1900 it was estimated that the death rate in Paris was thus reduced from 72 to 12 per 1,000 population; in Berlin, from 125 to 32 per 1,000; and in New York, from 187 to 45 per 1,000. It is estimated that fully 1,150 lives were saved in Chicago in the two years 1899-1900. This estimate is fully borne out by the experience in London in 1908. See **Antitoxin.**

DIPHTHONG, the union of two vowels which are pronounced together in one syllable, with one impulse of the voice, as in *out, soil,* and *lou.* The term *improper diphthong* is applied to a word in which two vowels are written together, but only one representing a sound, as in *beat, bean,* and *bread.* Many diphthongs in modern English were developed from monophthongs, or simple vowel sounds, as the modern *mouse,* which was derived from the old English *mus.*

DIPLOMACY (dĭ-plō′mȧ-sĭ), the term applied to the art of negotiating and arranging treaties between nations. This branch of knowledge relates to the forms of international negotiations, the relation of independent states to one another, and the management of envoys accredited to foreign courts. Intricate diplomacy like that of modern times did not exist in the nations of antiquity for the reason that the scope of civilization was often confined within the limits of a single empire. In Greece, Rome, Persia, and other ancient nations political agents were employed to discuss national affairs. The primitive movement in bringing about the regular intercourse existing between civilized powers has been accredited to the efforts of Cardinal de Richelieu, though the representatives sent by the Florentine republic to Charles V. tends to show that he was not the first to perceive the benefits to be derived from such a system. Among the diplomatic agents recognized are ambassadors, envoys extraordinary, ministers plenipotentiary, ministers resident, *charge d'affaires,* secretaries of legation, and *attaches.* The powers and dignities of these agents are graded successively in the order named.

DIPPER (dĭp′pẽr), a bird of the thrush family, but quite similar in appearance to the wrens. The bill is sharply pointed and almost straight, the plumage is compact, and the tail turns slightly upward. Several species are noted for their song. They live near the banks of streams and the shores of lakes, and feed on mollusks and aquatic insects. The dippers are so named from their habit of dipping the head, which is accompanied by an abrupt upjerking of the tail. Several species are found in the highlands of the United States and Canada, and others frequent many parts of Asia and Europe.

DIPPING NEEDLE, an instrument to test the magnetism of the earth at different places. It consists of a magnetic needle supported by a stirrup or within a frame so as to be free to move vertically. When placed horizontally and then magnetized, the needle will not remain horizontal, but will dip toward the nearer pole of the earth. The angle of dip decreases as the distance from the magnetic equator increases. There is no dip at the magnetic equator, but the needle will assume a vertical direction at the magnetic poles, hence the distance increases from zero to ninety degrees.

DIPSOMANIA (dĭp-sō-mā′nĭ-ȧ), the morbid craving for alcoholic drinks, classed as a form of insanity. The attacks are periodical and when they occur the patient has an uncontrollable desire to drink excessively, but during the intervals he seems mentally sound and may abstain entirely from the use of liquor. The disease has been treated successfully in asylums for the inebriates. Institutions of this kind are maintained successfully in many states and countries.

DIRECTORY (dĭ-rĕkt′ō-rȳ), the name applied to the government in France which was established by the constitution of Aug. 22, 1795. This body was composed of five members, who ruled in conjunction with two chambers—the Council of Ancients and the Council of Five Hundred. It was deposed by Napoleon Nov. 9, 1799, who assumed the government with Charles F. Lebrun and Jean J. Cambacérès as three consuls, on Dec. 15, 1799, his office being that of first consul.

The name directory is applied to a book which contains the names of the inhabitants of a city or district. Directories are published at frequent intervals. In them the names of citizens are given in an alphabetical order, together with the place of abode and business or profession of the individual. Various directories are issued by the government, the principal and most used work of this kind being the "Official Postal Guide." Such a directory contains a list of all the post offices, giving the counties and political divisions in which they are located.

DISCOUNT (dĭs′kount), a deduction from a sum of money due at a future date, or from the price at which a commodity is generally sold. Banks usually deduct a small per cent. from the face of a note when purchasing such a paper, called *bank discount,* and this deduction is an item of profit in addition to the rate of interest specified in the note. When a loan

Catholic theology marriages are indissoluble, though special dispensations have been granted in exceptional cases.

General provisions were made for the legal separation of husband and wife in the early history of the American colonies. All the states followed this course with the single exception of South Carolina, where divorces are not granted by law. The proportion of divorces to marriages in the United States is one to fifteen. However, provisions for granting divorces and the conditions justifying them under the laws of the several states are extremely various, though a divorce decreed by any of the states having competent jurisdiction is recognized as effective by the other states. The general complexity of divorce codes has led to a discussion favorable to uniform legislation in all the states. It is thought that the divorce laws of the District of Columbia are generally satisfactory to the various states, and the agitation has been largely favorable to modeling the divorce laws of the several states after them. A proposition to change the Constitution whereby Congress would be given power to pass uniform divorce laws has been considered at various times, but has been uniformly rejected as impracticable.

In Canada the divorces are less common than in the United States. Only 135 were granted in the period of 21 years ending in 1905, and the larger number of these were in Nova Scotia and New Brunswick. This function of the government is vested in the courts or in the legislative bodies, and the number of divorces are uniformly larger where they are granted by the courts. In some instances the divorcees are not permitted to remarry. An *alimony* is an allowance made to the wife out of the estate or income of her husband, after she has been legally divorced or separated from him.

DIX, Dorothea Lynde, philanthropist and author, born in Worcester, Mass., in 1794; died in Trenton, N. J., July 19, 1887. After completing her education, she taught school in Boston until 1834, and visited Europe for the purpose of inspecting the methods of treating criminals and unfortunates. On returning to America she devoted her time to investigating the condition of lunatics, paupers, and prisoners in the several states east of the Rocky Mountains, and by persistent effort induced favorable legislation for the poor and unfortunate. Petitions to Congress were circulated in all parts of the country at her suggestion, asking that 10,000,000 acres of land be appropriated to found asylums for pauper lunatics. A bill to this effect passed Congress, but was vetoed by President Pierce. She was superintendent of hospital nurses at Washington during the Civil War. Among several works published by her are "Conversation about Common Things" and "Prison and Prison Discipline."

DIX, John Adams, soldier and statesman, born in Boscawen, N. H., July 24, 1798; died in New York City, April 21, 1879. He was educated in Montreal and Boston, entered the army in 1812, and was promoted captain in 1825. Soon after he resigned his commission, entering upon the study of law, and was admitted to the bar in 1828. In 1833 he was appointed secretary of state for New York. He was elected to the State Assembly in 1833 and in 1845 to the United States Senate as a Democrat. He became Assistant Treasurer of the United States in 1853, postmaster of New York in 1859, and Secretary of the Treasury in the Cabinet of President Buchanan in 1860. He entered the army at the beginning of the Civil War as brigadier general, and was appointed major general of volunteers. In 1864 he served in suppressing the riots in New York, and later became commander of the department of the East. He was appointed naval officer of the port of New York in 1866, but in the same year became minister to France, and was elected Governor of New York in 1872 as a Republican. His public career distinguished him as a decided friend of educational and commercial development, and as an honest public administrator. Among his literary productions are "A Winter in Madeira," "Speeches and Addresses," "A Summer in Spain and Florence," and two translations of the hymn "Dies Irae."

DIX, Morgan, clergyman, born in New York City, Nov. 1, 1827. He graduated at Columbia College and the General Theological Seminary, and in 1853 was ordained priest in the Protestant Episcopal church. In 1855 he became assistant minister of Trinity Church, New York, and was made rector of the parish in 1862. He was president of the house of clerical and lay deputies a number of years, but resigned in 1901 on account of advancing age. His writings are very numerous and have been widely read among church members and others. Among his books are "Gospel and Philosophy," "Lectures on the Authority of the Church," "Expositions of the Epistle of the Romans," "Good Friday Addresses," "Lectures on the Calling of a Christian Woman," "The Sacramental System," and "History of the Parish of Trinity Church, New York City."

DIXIE (dĭks'ȳ), the name of a popular song, which became a rival of *Yankee Doodle* in the Southern States during the Civil War. The name was first applied to a negro melody originated in New York, where a man named Dixie was a slaveholder. As the abolition sentiment grew stronger, he shipped his slaves south, and the refrain expressed their regrets on account of leaving Dixie's Land, as his plantation was called. Later the term was applied in a happy way to all the Southern States.

DIXON (dĭks"n), county seat of Lee County, Illinois, on the Rock River, about ninety miles west of Chicago. It is on the Illinois Central and the Chicago and Northwestern rail-

roads. The noteworthy features include the high school, the county courthouse, and the Northern Illinois Normal School. The manufactures include condensed milk, musical instruments, furniture, lumber products, machinery, flour, and implements. It has systems of waterworks, sewerage, electric lighting, and street pavements. The surrounding country is a fertile farming district. It was settled in 1836 and incorporated in 1869. Population, 1900, 7,917; in 1910, 7,216.

DNIEPER (nē'pĕr), an important river of Russia, next to the Volga and Danube the largest in Europe. Its source is in the government of Smolensk, at the foot of the Valdai Hills. It has a southerly course to Kiev, thence makes a bold curve toward the southeast, thence south, and thence southwest, flowing into the Black Sea. The total length is 1,325 miles, and it is navigable from a point some distance above the city of Smolensk. Among its principal tributaries are the Pripet, Beresina, and Desna. The government of Russia removed the rocks forming a cataract between Kiev and Alexandrovsk, and otherwise improved it for the enlargement of internal navigation. It also caused the building of numerous canals, among them one connecting the Dnieper with the Düna, thus making a continuous water route from the Baltic Sea to the Black Sea. The Dnieper is crossed by many bridges, has on its banks numerous commercial centers, and is itself of vast value in commerce. The lower course is noted for valuable fisheries. In the early history of Europe it was regarded the largest river in the world, except the Nile.

DNIESTER (nēs'tĕr), a large river of Eastern Europe, rises in the Carpathian Mountains, in northeastern Austria. The main course through Russia is toward the southeast, passing from near Chotin toward Odessa, near which it flows into the Black Sea, after a course of about 850 miles. Owing to numerous rapids and shallows, it is navigable only for small vessels, though canals have greatly increased its service to commerce. It is subject to overflow from the effect of snow melting in the mountains in May and June. The principal cities on its banks include Bender, Mohilev, and Akerman.

DOANE (dōn), **George Washington,** bishop, born in Trenton, N. J., May 27, 1799; died April 27, 1859. After graduating at Union College in 1818, he studied law and later theology. In 1821 he was ordained deacon, selected as professor of rhetoric at Trinity College in 1824, and consecrated bishop of New York in 1832. He founded Saint Mary's Hall in Burlington in 1837, and established Burlington College in 1840. A year later he visited England and preached in various places. In 1824 he published "Songs by the Way." His miscellaneous writings and sermons were published by his son, William Croswell Doane (q. v.).

DOANE (dōn), **William Croswell,** clergyman, born in Boston, Mass., March 2, 1832. He graduated at Burlington College, New Jersey, in 1850, and was ordained a priest of the Protestant Episcopal Church in 1856 by his father, G. W. Doane, who was bishop at Burlington. For some time he assisted his father in Saint Mary's Church, Burlington, and subsequently was rector of important churches in Connecticut and New York. He was consecrated bishop of Albany in 1869, and in 1902 became chancellor for the University of the State of New York. He founded Saint Agnes's School for Girls. His publications include "Epistles and Gospels for the Sundays of the Year," "Mosaics, or Harmony of the Collects," and "Rhymes from Time to Time."

DOBBS FERRY (dŏbz), a village of New York, in Westchester County, twenty miles north of the center of New York City. It is located on the Hudson River and on the New York Central and Hudson River Railroad, at the south end of an expansion in the Hudson known as Tappan Bay. Many New York business men reside here. It has a number of fine churches and many modern public utilities. Washington and Rochambeau met in the old Livingston mansion at Dobbs Ferry to plan the Yorktown campaign. Another conference was held at the same place in 1783, between Washington, Clinton, and Carleton, to consider the withdrawal of British troops from America. Population, 1900, 2,888; in 1910, 3,455.

DOBSON (dŏb'sŭn), **Henry Austin,** author, born in Plymouth, England, Jan. 18, 1840. After studying in England, he took a course of instruction in Germany with the view of adopting the profession of a civil engineer. However, his inclination was more largely toward literature, especially after becoming acquainted with German writers, and he became a frequent contributor of verse and prose to periodicals. His productions embrace many graceful and light forms of drawing-room verse, including adaptations from the French. Later he devoted himself more largely to prose, some of his writings in this line constituting popular works. Among his productions are "Proverbs in Porcelain," "At the Sign of the Lyre," "Old World Idyls," "Memoirs of Horace Walpole," "Eighteenth-Century Vignettes," and "Thomas Bewick and His Pupils." He wrote introductions to various biographies and historical works.

DOCK, an artificial excavation or structure for receiving ships to be repaired, loaded, or unloaded. There are several classes, the most common being the wet docks, dry docks, and hydraulic docks. *Wet docks* are intended for loading and unloading vessels. They are made either by excavations near the shore, or by constructing walls of timber or solid masonry. The latter kind is used where tides cause material changes in the level of the water, the

ship entering at the time of flood tide, and, when closed, the water is kept at the desired level. This class of docks provides protection for ships against storms and the action of tides.

Dry docks are used to admit vessels to be examined and repaired. They are of such construction that gates can be closed after the vessel enters, when the water is pumped out, leaving the vessel resting on timbers while the shipwrights are engaged on the repairs. A *floating dock* is a form of dry dock. It is sunk below the surface of the water, allowing the vessel to float into it, after which it is raised and the water is pumped out of the surrounding tank. *Hydraulic docks* are likewise a kind of dry docks. They ordinarily have a system of iron columns, each containing a hydraulic press, by means of which the vessel is raised above the surface of the water. The hydraulic presses are worked simultaneously by



DRY DOCK.

powerful steam engines. The presses, working on iron pontoons, are first properly adjusted, and the ship is raised and securely suspended above the water by means of girders. After the vessel has been raised and secured in its position, the pontoon may be floated away and used for elevating other vessels, thus furnishing means whereby a number of vessels may be inspected and repaired at the same time.

Wet and dry docks are maintained in all important seaports. They are usually in charge of a dock master, the official who has control and general superintendence. *Dockyards* are inclosed magazines near harbors, in which all kinds of necessary stores and material are deposited. Among the principal dockyards of the United States are those of New York, Washington, Boston, Pensacola, Portsmouth, N. H., League Island, Pa., Mare Island, Cal., New London, Conn., and Portsmouth, Va. The dockyards of Canada include those of Montreal, Quebec, Saint John, and Vancouver. Glasgow has the most extensive dockyards in Europe.

DODDER (dŏd'dĕr), a genus of parasitic plants native to the temperate regions. They are leafless, climbing plants, and the flowers grow in dense clusters. The young plant begins its growth in the ground and twines upward, fastening itself to the plant from which it derives nutriment, and later the rootlets become severed from the soil. About fifty species have been classified, including those that are parasitic on hops, flax, clover, alfalfa, nettles, and leguminous plants. Some are very injurious to wheat and clover, especially in Europe. About twenty species occur in the United States.

DODDRIDGE (dŏd'rĭj), **Philip,** clergyman and author, born in London, England, June 26, 1702; died Oct. 26, 1751. He was educated at the theological academy of Kibworth, became pastor in 1722, and a few years later was chosen president of the academy from which he graduated. A large number of the Protestant ministers who dissented from the Church of England in the middle of the 18th century were educated at this academy. Doddridge sailed to Lisbon in 1751 to recuperate his health, where he died soon after. He was the principal officer of the academy for twenty years, and was noted for deep piety and an amiable disposition. His principal works include "The Rise and Progress of Religion in the Soul," "The Family Expositor," and a course of lectures in six volumes.

DODGE (dŏj), **Greenville Mellen,** soldier and civil engineer, born in Danvers, Mass., April 12, 1831. He studied at Norwich University, Vermont, in 1854, was engaged as railway surveyor by the government along the Platte River, and at the beginning of the Civil War joined the Federal army. In 1862 he commanded a brigade at Pea Ridge, and two years later was made major general of volunteers for valuable service at Sugar Valley and Resaca. He succeeded General Rosecrans in command of the department of Missouri, and subsequent to the war was chief engineer of the Union Pacific and the Texas Pacific railroads. He was Congressman from Iowa in 1867-69, and for many years was employed in building railroads. In 1898 he became president of the commission that was created to investigate the charges of mismanagement in the Spanish-American War. He died January 3, 1916.

DODGE, Mary Abigail, authoress, commonly known as "Gail Hamilton," born in Hamilton, Mass., in April, 1830; died Aug. 17, 1896. She was instructor of physical science in the Hartford, Conn., high school, and later became governess at Washington, D. C., in the family of Gamaliel Bailey, who was editor of the *National Era.* To that periodical she became a regular contributor, and later was one of the editors of *Our Young Folks.* She was closely related to the wife of James G. Blaine,

assisting in writing the biography of the latter. Among her numerous writings are "Country Living and Country Thinking," "Twelve Miles from a Lemon," "English Kings in a Nutshell," "Skirmishes and Sketches," "Gala Days," "Woman's Worth and Worthlessness," "Insuppressible Book," and "The Battle of the Books."

DODGE, Mary Elizabeth Mapes, authoress, born in New York City in 1838; died Aug. 21, 1905. She was left a widow in early life with two sons depending upon her for support. Soon after she engaged in literary work and became one of the editors of *Hearth and Home.* In 1873 she was given charge of *Saint Nicholas* and attained much success as its editor. A number of her productions have been translated into various languages and published in several European countries. Among her best known works are "Donald and Dorothy," "When Life Is Young," "Along the Way," "Rhymes and Jingles," "Land of Pluck," "Theophilus and Others," and "A Few Friends."

DODGE, William Earle, philanthropist, born in Hartford, Conn., Sept. 4, 1805; died in New York City, Feb. 9, 1883. He entered business in New York in 1826 as a manufacturer and importer, and attained much success in these enterprises. Later he became interested in benevolent and religious institutions, contributing large sums for the establishment of the Protestant College at Beyrout, Syria. In 1861 he was a member of the peace convention, and served as a Republican member of Congress in 1866-67. A statue was erected to his memory at Hartford two years after his death.

DODGSON (dŏj'sŭn), **Charles Lutwidge,** mathematician and author, born in England, in 1832; died Jan. 14, 1898. He graduated at Oxford in 1854, where he was a lecturer for twenty years, beginning in 1855, and in 1861 he was ordained as minister. His writings were largely for children, under the pseudonym of "Lewis Carroll." It is said that in his latter days he expressed the fear that his mathematical works would be obscured by his books of grotesque humor. Among his productions in mathematics are "Guide to the Mathematical Student," "Formulae of Plane Trigonometry," and "Syllabus of Plane Algebraical Geometry." His books for general reading include "Alice's Adventures in Wonderland," "Hunting of the Snark," "A Tangled Tale," and "Phantasmagoria and Other Poems."

DODO (dō'dō), a large bird that became extinct about two centuries ago. It inhabited Mauritius, an island in the Indian Ocean, east of Madagascar. Writers class this bird with the pigeons, though it was an extreme modification of that type. It had strong but ill-shaped legs, functionless wings, and a clumsy aspect, and the upper mandible was hooked like that of a bird of prey. The plumage was hairlike. In size and weight it was larger than a swan. Its extinction was caused by its inability to fly and the excellent quality of its flesh for food.

DODONA (dō-dō'nà), an ancient city of Epirus, in Greece, about eleven miles southwest of the site of modern Janina. It was located near Mount Tomarus, surrounded by rugged hills, and was the seat of an ancient oracle dedi-



DODO.

cated to Zeus. The priestesses received their communications by listening to the rustling of the leaves of an oak tree, which was supposed to be the seat of the deity. In 1887 extensive excavations were made, when an acropolis and the temples of Zeus and Aphrodite were located.

DOG (dŏg), the common name of a family of quadrupeds of the genus *Canis,* with which are included the wolf, jackal, and fox. However, the last mentioned is termed a subgenus by some writers. The origin of the dog family is not known, but the animal is thought to have resulted from a crossing of various extinct and living species of quadrupeds, as wolves and jackals. The question of descent has been de-



SETTER.

bated for many years among writers and naturalists. Though wild dogs inhabit several parts of the world, such as the *dhole* of India and the *dingo* of Australia, they are regarded merely domestic species that have merged into the wild type by being isolated from settlements for long periods of time. The dog has been a domestic animal from times far remote. Among the earliest allusions to it are those found in the books of Moses and in the writings of





(Opp. 810)

BREEDS OF DOMESTIC DOGS.

Upper View—Pointers.
Lower View—Shepherd Dogs.

is made to a customer by a bank, it is quite usual to deduct the interest in advance, hence the person borrowing receives a sum slightly less than the face of the note he gives at the time the loan is made. Merchants usually get a discount from the wholesaler when they pay cash within ten days from the date of shipment, or a smaller discount if they pay within thirty or sixty days, and quite frequently the merchant has a similar system in giving his customers a small discount where a bill is paid cash or within a short time. Deductions of this kind are said to be based on trade or commercial discounts.

DISEASE (dĭz-ēz′), a state of ill health, usually applied to the absence of health from all causes except old age. *Organic* diseases arise from an unhealthy condition of the organs of the body, while *functional* ailments are due to causes which prevent the organs from doing their work properly, though they may be sound. Diseases may exist without pain or uneasiness in the ordinary meaning of these words, but hardly without functional disturbance or incapacity of some kind. Bacteria, sudden exposure, and foreign substances that cause poisonous products within the body are among the prolific causes of physical ailments. Diseases are either *diathetic* or *enthetic*, the former arising from predisposition and the latter from without the patient.

DISEASES OF PLANTS, the ill health of plants, which causes their death or interferes with their normal development. The importance of this topic has been developed under a systematic study of plant life, and writers have become able to group and treat plant diseases with a high degree of accuracy. They are usually classified according to their causes, which are fungi, insects, bacteria, and physiological. The *fungi* include such diseases as mildews, grape rot, potato rot, and the smuts and rusts of grains. Diseases of this kind are spread by minute spores, which are carried from plant to plant by insects, by the wind, and by other agencies. The plant on which they lodge is attacked, if the conditions are favorable, and the diseases make rapid progress when they are developed, causing either death or decay of a part or of the entire plant.

The diseases due to *insects* are numerous, especially in the forests and orchards. The phylloxera (q. v.), a prolific cause of disease among grapes and orange trees, is much dreaded in many parts of Europe. Carnations and many other flowering plants are attacked by the aphides, and eelworms attack the roots and cause galls in many economic plants. Diseases due to *bacteria* include the black rot of cabbage, the blight of apples and pears, and a wilt disease in cucumbers and melons. *Physiological* diseases are due chiefly to unhealthful conditions that surround the plants, such as unsuitable light and heat and improper nutrition. Plants subjected to ill health from these and similar causes turn yellow and rarely develop their fruit.

DISMAL SWAMP, a tract of marshy land located in North Carolina and Virginia. Formerly it was forty miles long and twenty miles wide, but it has been reduced somewhat by draining. It is covered largely with trees, consisting mostly of cypress, juniper, and cedar, with dense brushwood underneath. In the most elevated portions oak and beech trees abound. Canals have been constructed through it, being utilized for shipping timber for the manufacture of railroad ties, lumber, and shingles. Lake Drummond, six miles in length, is a sheet of water in the midst of the swamp. A navigable canal connects this region with Albemarle Sound and Chesapeake Bay.

DISRAELI (dĭz-rā′lĭ), **Benjamin.** See **Beaconsfield.**

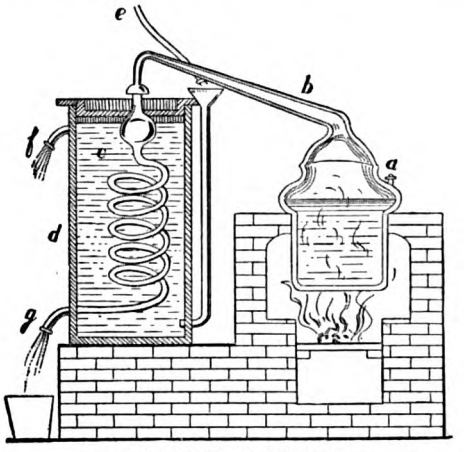
DISRAELI, Isaac, author, father of the Earl of Beaconsfield, born in Middlesex, England, in 1766; died Jan. 19, 1848. He was educated at Amsterdam and Leyden and began a career as a poet and novelist, but soon after devoted himself to historical work. His writings are instructive and noted for elegance in style and pleasing characteristics. Among his principal works are "Curiosities of Literature," "Inquiry into the Literary and Political Character of James I.," "Life and Reign of Charles I.," "Essays on the Manners and Genius of the Literary Character," and "Amenities of Literature." The greater portion of his life was spent in library research. Oxford granted him an honorary degree, while Lord Byron spoke of him as "that most entertaining and searching writer."

DISTAFF (dĭs′tăf), a simple instrument used in spinning, employed extensively by the people in ancient times. It is in the form of a staff, on one end of which the wool was rolled. The spinner held it in the left hand while the right hand was occupied in drawing out the fibers of the wool and at the same time twisting them. A small piece of wood called a *spindle* was attached to the thread, the weight of which continually carried it down as it was formed. When the spindle reached the ground it was unfastened, the thread which had been formed was wound around it, and it was then again fastened near the new thread. A modified form of the distaff is still used by the peasants of Greece. The Fates are represented in ancient and modern art with the distaff, with which they are busied spinning the thread of life.

DISTEMPER (dĭs-tĕm′pĕr), a mode of painting, in which the colors are coarser than those used for higher artistic purposes, and are mixed in a watery glue, such as sizing and whiting. Formerly it was employed in the higher departments of art, but now it is used chiefly in making wall paper and in scene painting.

DISTILLATION (dĭs-tĭl-lā′shŭn), the proc-

ess of heating solids or liquids in a retort or vessel so constructed that the vapors thrown off are collected and condensed. A representation of the apparatus used is shown in the accompanying illustration. The retort or vessel,



DISTILLING APPARATUS.

marked *a* in the figure, is called the body of the still, in which the vaporization takes place, and from it the vapor is carried by pipe *b*, to the refrigerator, which is cooled for condensing purposes by a stream of cold water flowing in through pipe *e*, and out through pipe *f*. The worm tub *d* contains the coiled tube, or worm *c*, in which the condensation takes place, and the distilled liquid flows out at *g*. Distillation is of great value in manufactures and the arts. It enables the chemist to obtain pure or distilled water. Sea water can be rendered wholesome by distillation, while essences and volatile oils may be extracted from plants by this process with alcohol or water. It is utilized most extensively in manufacturing alcoholic spirits. In the process of manufacture a wort is prepared from malt or some other substance at a temperature not above 160° Fahr. After separating it from the grain and cooling, a quantity of yeast is added. Fermentation takes place readily at about 65° Fahr., in which process the saccharine matter of the wort is resolved into carbonic acid and alcohol, the latter remaining in the liquid. The alcoholic mixture is run into a still as soon as the liquor ceases to ferment and submitted to distillation.

The character and strength of the distilled product depend upon the construction of the still; the first distillation is quite weak, while the second has the effect of greatly strengthening it. In the process the easily vaporized parts are separated from the rest and retain the flavor of the juice from which they are made. The malt liquor is flavored with the essential oil of barley, rum with the oil of the sugar cane, brandy with the oil of the grape, and gin with the oil of the juniper.

Destructive distillation differs from the process described in that the temperature is raised sufficiently high to decompose the substance, and bodies are produced that do not exist in the original matter. The substances are subjected to the action of intense heat out of contact with the air. It is variously conducted, and for widely different purposes in the same or different substances. Wood is distilled partly to secure charcoal and partly for the tar and pyroligneous acid. Coal is distilled to obtain the gas, anthracene, benzole, and ammoniacal water, and sometimes to secure the fixed carbon or coke. In the distillation of bones the charcoal and oil are collected. Shale is submitted to the process solely to obtain the oil.

DISTRICT OF COLUMBIA, a Territory of the United States, located between Virginia and Maryland, on the east bank of the Potomac River. The area is 64 square miles. It has a gently rolling surface, except along the Potomac, where flat and marshy tracts occur. The southern part is crossed by the Anacostia River, which flows into the Potomac, and the northern part is traversed by Rock Creek. About one-fifth of the surface is in farms and gardens, although the soil is light and sandy. The remainder is occupied by the city of Washington, Uniontown, and a number of villages. Fruit, flowers, hay, and vegetables are the chief products.

Originally the District of Columbia contained 100 square miles, of which 64 were ceded by Maryland in 1788 and 36 by Virginia in 1789. It received the official name of the Territory of Columbia in 1791, and the capital was removed thither in 1800. The portion south of the Po-



tomac was given back to Virginia in 1846; thus it lies wholly east of that river. Congress administered the affairs of the district prior to 1871, but in that year it was placed upon a territorial basis. Henry D. Cooke served as Gov-

ernor from 1871 to 1873, and Alexander Shepherd from 1873 to 1874. Since 1874 the government has been vested in the hands of a local corporation, with an executive branch consisting of three commissioners, one of whom must be an officer of the engineer corps and the other two are appointed by the President of the United States. Subordinate municipal officers are appointed by the commissioners, while the recorders, justices of the peace, and judicial officers are appointed by the President.

The inhabitants are centered very largely in the city of Washington and the villages are properly suburbs. Though Georgetown was formerly a separate corporation, it has been a part of Washington since 1878. In 1900 the total population was 278,178. Of this number 218,196 were in the old limits of Washington; 14,529, in the old limits of Georgetown; and 45,973, in the remainder of the district. In 1905 the population was 323,143, including 95,695 negroes. Population, 1910, 331,069. See **Washington.**

DIVERS (dī'vērs), a family of swimming birds remarkable for their power and habit of diving. They are known by their webbed toes, short and rounded tail, short wings, and straight, strong, and pointed bill. In flight they are remarkably rapid, and their movement under water is speedy and well directed. They pursue fish for food by moving rapidly, propelling themselves by their feet and wings, and frequently remain under water for some time before emerging. Divers are most common in the north, where they breed in the summer, and they move southward in the autumn. Large numbers are found in Northern Europe and America. The *great northern loon* of Europe is the largest of the various species, being nearly three feet long. It and several closely allied birds are valued for fine plumage.

DIVIDE (dĭ-vīd'), or **Watershed**, in physiography, the crest line which divides the slopes of two drainage systems Divides are characterized by various physical features, ranging from the low watersheds in regions slightly elevated above the sea to the crest lines of mountain systems, where the slopes are usually quite abrupt or precipitous. However, gentle slopes are abundant even in regions elevated greatly above sea level. North America has three marked divides, those of the east, of the central part, and of the west. The Appalachian Mountains, in the eastern part of the United States, form the divide between the rivers of the Atlantic coastal plain and those flowing into the Mississippi from the west. The Height of Land, situated in the north central part of the United States, is the watershed between the northern section of the Mississippi valley and the rivers of Central Canada, and the Rocky Mountains, in the western part of North America, separate the headwaters of the streams flowing into the Pacific from those of the central part of the continent. In some places the divides are low and channels are cut through them by streams, causing them to change their direction, while in others a slight overflow occurs only during high water. Instances of this kind occur in the Des Plaines River, Illinois; the Twin River Lake, Yellowstone Park; and the Cassiquiare River, South America.

DIVINATION (dĭv-ĭ-nā'shŭn), the art of foretelling future things by revelations from oracles or omens. Those who profess the power to divine or foretell future events rely upon observing the flight of birds and clouds and the movement of the planets, or base their belief on the influence of spirits or supernatural causes. Various forms of divination were practiced by the ancient Romans and Greeks, who probably came to believe in the art from the practices which prevailed in Egypt and Chaldea. The laws of Moses prohibited it among the Israelites, who were not permitted to perform any kind of divination. The medicine men among the Indians of America practiced it to some extent, and it still has adherents in some countries.

DIVINE RIGHT OF KINGS, the claim made by some sovereigns that they hold their office by divine appointment. According to this view, they assert the right to govern their subjects without interference, opposition to the government being regarded in the light of a sin. This doctrine was held by numerous English sovereigns and princes, especially in the time of the Stuarts. It is a tenet pleasing to despotic rulers, and proportionally displeasing to the mass of their subjects. It is spoken of by Pope in these words, "The divine right of kings to govern wrong."

DIVING (dīv'ĭng), the art of descending and remaining for a certain period of time under water, especially when using a diving bell. As an art diving is important, being highly serviceable in fishing for pearls, sponges and corals, and in examining the bottom of rivers and the sea. It is utilized largely for engineering purposes, recovering valuable stores of sunken ships, and raising or removing sunken vessels. A skillful diver may remain under water from two to three minutes without the aid of artificial appliances. This form of diving was practiced in early times near the shore, but has gone largely out of use. In order to do effective service, it is necessary to supply the workman with apparatus by which fresh air can be conveyed in sufficient quantities to enable him to remain under water for some time. This is done successfully by various appliances.

The diving bell, though used in quite ancient times, was first made of material value in the 18th century. It is so named from its form, being shaped like a bell. The principle employed may be illustrated by inverting a tumbler and pressing it down into a vessel of water. While the water rises to some extent in the tumbler, yet the upper portion remains per-

fectly dry, and in it a candle will burn for a short time with even increased energy, on account of the air being condensed by pressure. The diving bell is connected above the surface of the water by flexible pipes, making it possible to inject pure air by a force pump, while the impure air escapes at the upper part of the bell by a cock. It is generally made of cast iron, containing strong convex lenses in the roof or upper side for the admission of light to the person within and is suspended by chains from a vessel above. In the newer forms are provisions by which the workmen may move the apparatus or raise or lower it at pleasure.

A waterproof diving dress is another appliance used by divers. It is made of India rubber cloth inclosing the entire body, except the head. The head is covered by a helmet con-



DIVING DRESS AND TUBES.

taining three eyeholes covered with glass and protected by guards. An air pump above supplies air by means of a flexible tube connected with the helmet and the impure air passes off through another flexible tube to the surface of the water, though in some the air escapes through a valve. The diver sinks to the bottom by leaden weights attached to the soles of the shoes or to the feet. A speaking tube enables him to converse with those above quite as conveniently as through a telephone. Recently an apparatus utilizing compressed air has been introduced. In this form the air is supplied by means of a self-regulating device corresponding to the water pressure. This and other classes of diving apparatus frequently have an appliance attached by which bubbles indicate the condition of the diver, and assistants stationed at the top are informed of his safety. A diver rarely remains under water more than an hour and a half, and about 150 feet is usually the greatest depth at which extensive work can be conducted with safety.

DIVISION OF LABOR, the term applied in the industries to a classification of the work done by the workman. The more or less clearly defined inclination in each individual, especially so far as it relates to occupation, and various desires in different persons, have led to the modern diversification in trade and industry. The consequent division of labor has given to modern industries enlarged and enormous productiveness. It has been found that a given number of persons can produce a greater total of wealth by confining themselves individually to one thing than if each person worked by himself, endeavoring to produce everything he desires.

To illustrate the advantage, each man of a thousand working by himself might produce a coat, a barrel of flour, and a pair of shoes in a certain time, and the one thousand men might produce one thousand of each of these articles. However, if each one-third of the men devoted themselves to the production of one of the three different commodities, the output would be considerably larger. In this way a workman, producing more than one thing which others want, can get in exchange more of the things he himself wants, and in the end be the producer of vastly greater quantities of wealth. This principle has been acted upon to such an extent that a great diversity of occupation has been caused in every community, and by means of it the necessity of greater exchange has been created.

Among the several advantages coming from the division of labor may be enumerated economy of time, strength, skill, and tools. Besides, it facilitates economy of material and supplies, and improves, diversifies, multiplies, and cheapens the product. The general improvement in tools and machinery may be largely attributed to the principle underlying it, and the massing of labor and capital has likewise resulted, though it has had the effect of limiting somewhat the usefulness of the workman as an all-round laborer.

DIVORCE (dĭ-vōrs'), the partial or total dissolution of a previously contracted marriage. The former constitutes the judicial separation of the two parties, while in the latter the marriage itself is set aside. The ancient Spartans rarely granted divorces, while the Athenians and other Greeks allowed them frequently for trivial causes. During the early epoch of Roman history divorce proceedings were extremely rare, though in the later period, especially in the republic, they became common. The right to institute divorce proceedings in the Roman court was vested both in the husband and wife. The Scriptures limit the separation of husband and wife to very narrow channels, while in the

Homer. The figure of a mastiff is carved on an Assyrian monument, while an Arabian boarhound with its tightly curled tail is represented in Egyptian sculptures. From numerous Roman, Greek, and Celtic writings it is learned that dogs were sacrificed to certain deities. They were employed very early as executioners, and as living tombs for the consumption of carrion and human corpses.

In size and other respects dogs differ very largely, which fact has given rise to many species and different classifications. Some are not more than a few inches high, while others attain a height of from two to four feet, and are correspondingly proportioned in other respects. They represent all colors, have variously formed ears, heads, and limbs, and differ largely in the size and character of their hair. A species of dogs found in India has no hair at all. Some have smooth, others straight, others curly or shaggy, and some long, wavy hair. The difference in voice and habit is fully as great as in size and appearance, and consequently they serve many widely different purposes.



SAINT BERNARD.

Hamilton Smith arranged domestic dogs in six sections or groups as follows: 1. Wolf dogs, including such as the Saint Bernard, Newfoundland, Eskimo, Nootka, Siberian, and shepherd dogs. 2. Watch and cattle dogs, embracing the German boarhound, mâtin, dog of the North American Indian, and Danish dog. 3. Greyhounds, including the Irish hound, greyhound, brinjaree dog, lurcher, and Egyptian street dog. 4. Hounds, embracing the old southern hound, bloodhound, staghound, harrier, pointer, setter, spaniel, beagle, springer, cocker, poodle, and Blenheim dog. 5. Cur dog, including the terrier and their allies. 6. Mastiffs, embracing the different kinds of mastiffs, bulldog, and pug dog. In this classification he does not reckon the dingo, dhole, and several other species of wild dogs. These he does not include in the genus *Canis*. Besides, all the recognized species are not named under each division of this article. Other writers have made different classifications, but the one given here is among the most commonly accepted.

Cuvier regarded the dog as one of the most valuable domestic animals, owing to the useful purposes that it serves. It is true that each individual dog is devoted to his master, assuming largely his manners. It distinguishes and defends his property against intruders, often at the expense of life. The attachment formed remains until death, and springs rather from true friendship than from necessity. The highly developed sense of smell, strength, and swiftness has made the dog a powerful assistant of man in subduing other animals, and in serving many conveniences in society. The hunter is given valuable service by not only having the whereabouts of game located, but, after being slain, it is brought to him, even if the danger of flood and precipice have to be undergone.

As a watcher of property in all hours of the night and under all circumstances, the dog serves a useful purpose and designs to protect life and property against the encroachment of enemies and the elements. The labor of man has been greatly lightened in that the dog has been employed in the economy of life and in various industries. It is not only an aid in securing wild animals for food, but furnishes means of conveyance, as in the case of Eskimos and Siberians, and in the lighter service of going on errands and carrying parcels in cities.

As a source of relief in danger the ability of dogs is illustrated by many adventures in saving life at sea and in prolonged and terrific snowstorms and blizzards. The acuteness of scent in some species is so highly developed, particularly in the bloodhound, that they are able to follow in the track of a pedestrian at some distance. The story is told that Robert Bruce, in order to escape capture by being tracked by bloodhounds, walked in the water of a stream for some distance, lifted himself out by the branches of a tree, and from its trunk proceeded on his course of escape. Bloodhounds were employed in many regions of the slaveholding states for the purpose of finding the whereabouts of fugitives and making their capture possible.

Dogs are used in some of the European army corps for service as guards in outpost work and for carrying ammunition and dispatches. They are favorite animals for performance in animal shows, and happily entertain audiences with many skillful and intelligent actions. They render good results in police work in the larger cities, where homes for lost dogs are kept, in order that those going astray may be killed or returned to their owners. In most countries a dog is regarded personal property, and the owner may be indemnified for willful injury, but may be held liable for damage done to others by the animal. During the warm summer season dogs are required to be muzzled in most of the larger cities to prevent injury on account of madness.

Most dogs have a long tail, which is curled upward. The teeth are well developed and en-

able the animal to pursue its carnivorous habits, though a portion of the food of some species consists of tender vegetable matter. The young are born with eyes closed, attaining sight in from eight to twelve days. Full maturity is reached at about two years, and the average life is from ten to twelve years, though a period of twenty years is not rare. The hide is valuable in making wearing apparel, such as gloves, light shoes, and fur coats.

DOGBANE (dŏg'bān), a perennial plant native to North America, found in open barren places from Canada to Alabama. A large number of species have been classified, including both herbs and shrubs. The common dogbane grows to a height of two feet, has a smooth stem, ovate leaves, pink flowers, and milky juice. It is valued for its medical properties, obtained chiefly from the bark of the root. The Indian hemp, a species quite common in Canada, yields a flaxlike fiber used by the Indians in making utensils and small wearing apparel.

DOG DAYS, a period of about forty days set apart by the ancients as the hottest season of the year, which occurred at the time Sirius, the dog star, rose in conjunction with the sun, about July 1. Owing to the precession of the equinoxes, the time is now different, and is usually counted from July 3 to August 11, the time being twenty days prior to the heliacal rising and twenty days after. The ancients looked upon the period of heliacal rising as having an evil influence on the earth.

DOGFISH, a species of fish allied to the shark and noted for its voracious and destructive habits. They are common near the American coast, especially off Massachusetts, and in the oceanic waters of Europe. Their characteristics include more or less spotted skin, blackish-brown color, length from three to five feet, and rough skin in some species. In weight they vary from six to twenty-five pounds. Some species are valued as food, but they are caught mostly for their oil.

DOGGER BANK (dŏg'gĕr), a large sand bank near the middle of the North Sea, about midway between Denmark and England. It is about 50 miles wide and 175 miles long, extending in a northeast and southwest direction. Near the coast of England it is about 50 feet below the surface of the water and the general depth is less than 120 feet. Important cod-fishing grounds extend across the Dogger Bank.

DOGMA (dŏg'mà), a word used originally to indicate an opinion, but now applied generally to an article of belief derived from authority. In the latter sense it is applied to the essential doctrine of Christianity, based upon the Scriptures or the writings of the Fathers of the Church. The English-speaking people prefer to use the term *doctrine,* but in many countries of Europe dogma is preferred. A separate professorship in the study of science of dogmas (Ger. *Dogmen*) is maintained in many of the universities of Germany.

DOG STAR. See **Sirius.**

DOG VIOLET, or **Dog's Tooth Violet.** See **Violet.**

DOGWOOD. See **Cornel.**

DOLE (dōl), **Nathan Haskell,** editor and author, born in Chelsea, Mass., Aug. 31, 1852. After studying in his native town, he attended Harvard University, where he graduated in 1874, and taught schools in Massachusetts. Subsequently he engaged as a writer and journalist, and was for some time connected with newspapers published in Philadelphia and other cities. He translated from Tolstoy and Daudet, and edited "The Rubaiyat of Omar Khayyam." Original works from his pen are "Life of Francis William Bird," "The Hawthorne Tree, and Other Poems," and "Omar, the Tent-Maker."

DOLE, Sanford Ballard, jurist, born in Honolulu, Hawaii, in 1844, his father being an American missionary in that island at the time of his birth. He was educated in Honolulu and the United States, admitted to the bar of Massachusetts, and became judge of the supreme court of Hawaii in 1887. When the provisional government was founded in 1893, he was appointed the president of Hawaii, and when the Hawaiian Islands became a republic on July 4, 1894, he was chosen its first president. He visited the United States in 1898, presumably on a mission to bring about annexation, and was warmly welcomed. After Hawaii was annexed by Congress, President McKinley appointed him on July 8, 1898, as a member of the committee to recommend to Congress suitable legislation for Hawaii. In 1903 he was made United States district judge of the Territory.

DOLL, a toy usually representing a little girl, but sometimes a boy or man. Dolls are made largely in Europe of jointed wood, and elsewhere of stuffed cloth, wool, and India rubber. Their heads and hands are usually of porcelain or wax. The custom is thought to be more ancient than civilization, having been found largely among savage peoples. With the invention and perfection of phonography came the talking dolls. These dolls laugh, whistle, sing, and talk, and are almost as common as the wax dolls so long favorites with children. Dolls were displaced to some extent in the United States in 1908 by a toy figure representing a small bear, called the *Teddy Bear,* so named from President Roosevelt. This toy is inclosed in fur or a furlike cloth.

DOLLAR (dŏl'lĕr), a monetary unit of value, equal to one hundred cents in the United States and Canada. It is coined of silver and gold, though the latter is rarely used. The dollar is the smallest denomination of paper money now in circulation, and the largest issued in silver. The same name is given to coins in Mexico, the Philippine Islands, and in many countries of South America. Some writers as-

sume that the name was abbreviated from Joachimsthaler, a coin circulated in 1518, in Bohemia, but some German writers derive the term from talent, the name applied to a pound of gold in the Middle Ages. The Dutch name is *daler,* and the German, *thaler.* The sign $, generally used at present to signify a dollar, is supposed to date from the celebrated Pillar dollar of Spain.

DOLLART (dŏl'lĕrt), a gulf on the northwestern coast of Germany, at the mouth of the Ems River, on the boundary of the Netherlands. It is about seven miles wide and twelve miles long, and was formed by inundations of the North Sea. The land began to be worn away in the latter part of the 13th century and the inundations continued until about 1540. Many villages were destroyed within this period, but some of the land has since been reclaimed as polder by the construction of dikes.

DÖLLINGER (dĕl'lĭng-ĕr), **Johann Joseph Ignaz,** theologian, born in Bamberg, Germany, Feb. 28, 1799; died at Munich, Jan. 10, 1890. He was the son of Ignaz Döllinger (1770-1841), a celebrated physiologist of Germany. After obtaining a liberal education, he received priestly orders in the Roman Catholic church in 1826, and became professor of church history in the University of Munich. He entered the Bavarian Parliament in 1845, where he was a leader of the party favoring the separation of the church and state. He advocated the abandonment of temporal power by the Papacy in 1861, and opposed the action of the ecumenical council in 1870, which decreed the infallibility of the Pope. The following year he was excommunicated by the archbishop, but remained popular, and was elected rector of the University of Munich. He founded the movement known as the "Old Catholic" and presided over its congress. Among his numerous publications of a historical character are "The Religion of Mohammed," "Treatise on the History of the Church," "The Doctrine of the Eucharist During the First Three Centuries," "Papal Legends of the Middle Ages," "Sketch of Luther," and "History on the Sects of the Middle Ages."

DOLLIVER (dŏl'lĭ-vĕr), **Jonathan Prentiss,** statesman, born in Kingswood, W. Va., Feb. 6, 1858. After attending the district schools, he took a preparatory course and entered the West Virginia University, from which he graduated in 1875. He was admitted to the bar in 1878, and in the same year removed to Iowa, settling in the city of Fort Dodge. Here he built up a successful law practice, took an active interest in politics, and was elected to Congress as a Republican in 1888, serving consecutively until 1900, when he entered the United States Senate as the successor of John H. Gear. He was re-elected in 1902 and in 1907. Dolliver ranks among the most eminent orators and debaters of the present time, and is in demand as a lecturer and political speaker. He was mentioned as a prominent candidate for Vice President in 1900 and 1908. He died Oct. 15, 1910.



JONATHAN P. DOLLIVER.

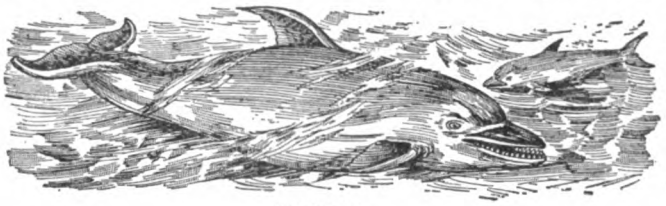
DOLLY VARDEN TROUT, a large fish found in the cold rivers of the Pacific Coast. It has a large head and mouth and a stout body, and the sides are marked with round red spots. The tail is almost truncate and the adipose fin is large. It is found in the northwestern part of North America, from the northern part of California northward to Kamchatka. In Oregon it is called bull trout and toward the Russian border it is known as malma or golet.

DOLOMITE (dŏl'ô-mīt), or **Magnesium Limestone,** a mineral composed of carbonate of lime and carbonate of magnesia, found widely distributed in all parts of the world. The colors are various, including reddish-white, brown, and yellowish-white. Pearl spar, so called from its luster, is a crystallized variety. Reddish dolomite contains manganese and cobalt, and brown spar owes its coloring to the presence of iron. Dolomite rock is employed extensively for building purposes. It is one of the materials that was used largely in the construction of the houses of Parliament in London. Large quarries are worked in Vermont, Tennessee, Georgia, and in the southeastern part of Canada.

DOLPHIN (dŏl'fĭn), a genus of fish belonging to the same family as the porpoises and narwhals. They are distributed widely from the Equator to the poles and commonly swim in companies of large numbers, their habits being largely gregarious. Their movement is skillful and with much velocity, often swimming beside the fastest vessels. They display their agility by many graceful movements, leaping into the air and then plunging through the water with a playful and rapid motion. Tourists are often delighted by their gambols as they come to the surface or may be traced by a slender wake of foam beneath the surface.

The snout is sharp and long, and there are numerous teeth in both jaws, but no organ of smell, dolphins being the only mammals having this distinction. The flesh is coarse and rank, although it is used as food by savages. Their food consists chiefly of mollusks, fish, and other water animals. A blowhole of a semilunar form is located nearly over the eyes, and they come to the surface at short intervals to breathe. The length varies from six to ten feet. The young are watched with care and anxiety by the females, who suckle them for some time after

birth. A species known as the *bottle-nosed dolphin* is most common on the eastern coast of North America, extending southward from New Brunswick. Other familiar species are the *black dolphin* and the *spotted dolphin*. A fish of the mackerel family, celebrated by poets on account of changing its color when dying, has been given the same name, though it is not a true dolphin. This species of fish is called



DOLPHIN.

Dorado by the Portuguese. It is native to tropical waters, attaining a length of from three to five feet.

DOME, the name given to a vaulted covering of the whole or a part of a building. It is applied more properly to the external part of a spherical roof, while the term *cupola* is used to designate both the external and interior parts. Most domes or cupolas have a circular form, though some are elliptical or polygonal, this depending on the figure of the base. A lantern or small dome is usually built at the top of a large dome, and is supported by the framework of the latter. In former times domes were constructed largely in the form of hemispheres of stone masonry, while those of modern construction are largely of timbers covered with a metallic surface protection. However, the newer domes have a framework almost entirely of iron or steel. The Rotunda or Pantheon at Rome, constructed under Augustus, is the largest masonry dome in the world, having an internal diameter of 142 feet and an internal height of 143 feet. It is still in a perfect condition. Other noteworthy domes are those of the Cathedral of Florence, Saint Peter's at Rome, Saint Sophia at Constantinople, and Saint Paul's at London. The finest dome in America is that of the capitol building at Washington. It is constructed of cast iron, has a diameter of 96 feet and a height of 180 feet, and is 288 feet above the base line of the east front. The weight of the iron in the dome and tholus is 8,009,200 pounds.

DOMENICHINO (dō-mĕn-ē-kē′nō), or **Domenico Zampieri,** eminent painter of the Lombard school, born in Bologna, Italy, in 1581; died April 15, 1641. He was the son of a shoemaker, who assigned him to study under Dionysius Calvart, and later he completed his training under Annibale Caracci. After devoting some time to painting in his native city, he proceeded to Rome, where he attained a high reputation, becoming painter to Pope Gregory XV., by whom he was employed as principal architect to complete the papal palace. He was a sufferer on account of the jealousy of rivals, who sought to do him injury mainly because of his remarkable ability in giving correctness, delicacy, and expressive force to his work. After leaving Rome, he opened a school at Naples, and there formed the so-called cabal of Naples. It is thought that his death was caused by poison administered at the instance of rivals. Among his best works are "History of Apollo," "Triumph of David," "Communion of Saint Jerome," and "Martyrdom of Saint Agnes."

DOMESDAY BOOK (dōōmz′dā), the name by which an old record of the lands of England is known. It contains an account of the statistical survey made in 1085-86 under William the Conqueror. There are two volumes written on vellum, a folio of 382 pages and a quarto of 450 pages. These books contain the names of the chief landowners, the value and extent of the estates, the kind and value of different personal property, and the name of the tenants. The record was made by a number of commissioners, who canvassed the country, being assisted in the work by the people of different sections. It furnished a basis for the organization of military forces and gave an account of the wealth and population, as well as titles to property. It was printed in facsimile in 1783 and 1816, and since 1861 has been converted to metallic plates. The Domesday Book furnishes a valuable record for the investigation and study of many questions relating to the early history of Great Britain.

DOMINIC (dŏm′ĭ-nĭk), **Saint,** founder of the Dominican order of monks, born at Calahorra, Old Castile, in 1170; died in Bologna, Italy, Aug. 4, 1221. His early life is surrounded with legends, in which he is described as a child who practiced self-denial and gave evidence of future devotion. He is said to have been brought up by an uncle, who was a devoted churchman and taught him the first lessons in divine and sacred things. At the age of fifteen he entered the university at Palencia, where he studied ten years. The story is told that he sold his clothes to feed the poor in the time of famine. He accompanied the Bishop of Osma in 1203 to negotiate the marriage of Alfonso VIII. of Castile with a Danish princess, and there came in contact with a life different from what he had been accustomed to see.

Saint Dominic found that the Danish literature and thought were devoted to the love of chivalry and much time was spent by the Danes in gaieties. About the same time he came in contact with the Albigenses of southern France, with whom the legates of the Pope had labored in vain to secure their conversion, and he promptly began the work they had given up.

Later he joined the crusading army sent by the Pope into the country, and in this capacity effected a notable revolution in the spread of Christianity. After conducting an extended crusade against the Albigenses, he repaired to Rome and devoted the remainder of his life to the order of Dominicans, which received the sanction of the Pope in 1216, and in the course of five years spread throughout most of the European countries.

DOMINICA (dŏm-ĭ-nē'kà), or **Dominique,** the largest island of the Leeward group, comprising a part of the British possessions in the West Indies. It is located between Martinique on the south and Guadeloupe on the north, and has an area of 291 square miles. The surface is mountainous, including some of the highest peaks in the Lesser Antilles. Morne Diablotin, the most elevated summit, has an altitude of 5,900 feet. Many of the valleys are fertile and well watered. Few indentations characterize the shore, hence the island has few good harbors. Among the principal products are indigo, coffee, cotton, sugar, and fruits, all of which are exported. Roseau, the capital, has a good trade and is well fortified. Columbus discovered Dominica on Nov. 3, 1493. In 1814 it became an English possession. Population, 1906, 29,695.

DOMINICAL LETTER (dŏ-mĭn'ĭ-cạl), one of the first seven letters of the alphabet, that is A, B, C, D, E, F, G, used in calendars to mark the Sundays throughout the year. The marking begins with the first seven days of the year, and all the succeeding days of the year are marked consecutively in sets of seven days; hence the 1st, 8th, 15th, etc., of the year are marked by A; and the 2nd, 9th, 16th, etc., by B, and so on. The dominical letter would be the same year after year, if the number seven divided the number of days without a remainder but since this is not the case, the dominical letters go backward one day every common year and two every leap year. Hence, the series repeat themselves in four times seven, or 28 years. The dominical letters are used to discover on what day of the week any day of the month falls in a given year.

DOMINICAN REPUBLIC. See **Santo Domingo.**

DOMINICANS (dŏ-mĭn'ĭ-kans), the name of an order of friar preachers founded by Saint Dominic at Toulouse in 1215. Owing to a black cloak formerly worn by them, they were called Black Friars in England, and in France they were known as Jacobins, from the first establishment of the order in the church of Saint Jacques in Paris. The rules of the order are based on those of Saint Augustine. They are bound to observe silence and abstinence from fresh meat, and their vows include observance of poverty, chastity, and obedience. The special aims of their institutes are the study of sacred sciences and ministerial duties. The order was confirmed by a bull of Pope Innocent III. in 1216. In the Middle Ages they divided the paramount influence in the church with the Franciscans, and in the 16th century the Jesuits took possession of the intellectual supremacy exercised by them. They gave to the church four popes and about seventy cardinals.

DOMINOES (dŏm'ĭ-nōz), a game played by two or more persons, with flat, rectangular pieces of wood, bone, or ivory. The pieces are about half as broad as they are long, 28 in number, and usually are plain black on the back and white on the front, but the latter face is divided by a line across the center, on each side of which are black dots, except that the ends of one set from 1 to 6 are left blank, so that upon each domino there is a different combination of numbers. Each player takes an equal number of the dominoes, selecting them after they have been mixed with their backs up. The person who has drawn the one which has the highest number of points puts it down. The next domino played must be one with a number the same as one of the two numbers represented by the first, and the two similar ends are joined. The third player may match the remaining number of either the first or second domino, and thus the game continues until one of the players has put down all his pieces and can neither draw nor match. The winner scores the number of points equaled by the dots on the pieces held by his opponent. This game depends partly on chance and partly on the memory and calculation.

DOMITIAN (dŏ-mĭsh'ĭ-ạn), **Titus Flavius Domitianus,** third Flavian Emperor of Rome, born in Rome Oct. 24, 51 A. D.; slain Sept. 18, 96. He was the son of Vespasian and the younger brother of Titus, succeeding the latter on the throne in 81. He was given control of Italy while his father was in the East, but on account of mismanagement was excluded from public affairs on the return of his father. When his brother Titus became emperor, he was still excluded from public life, but on the death of the former was declared emperor by the soldiers. His administration witnessed the enactment of good laws and internal improvements, but his personal military campaigns against the Germans were unsuccessful. He was defeated by the Dacians, caused the killing of Agricola in Britain on account of jealousy, and, when his soldiers on the Upper Rhine revolted in 93, he became suspicious of all his associates. A conspiracy was formed, largely on account of his intolerable conduct, and he was slain by the dagger of an assassin.

DON, a large river of European Russia, having its source in Ivan Lake, a small sheet of water in the government of Tula. It has a southerly course to the Sea of Azov, which it enters after flowing about 1,150 miles. The Don is navigable for large vessels during the spring floods, and at other times is fit only for small

craft. Owing to numerous shallows, the water is spread in some places to a width of 1,750 feet. It is connected by a canal with the Volga system of navigation, and as a whole carries a large interior traffic. The principal tributaries are the Khoper, Donetz, Manitch, and Sal. Productive fisheries abound in the larger portion of its course.

DONALDSON (dŏn'ăld-sŭn), **James,** educator and author, born in Aberdeen, Scotland, April 26, 1831; died March 9, 1915. He studied at Aberdeen, London and Berlin, and in 1852 became Greek tutor in Edinburgh University. In 1854 he was made rector of the high school in Stirling and subsequently held a similar position in Edinburgh. He became principal of the University of Saint Andrews in 1890, where he served a term of years with eminent success. His publications are "Modern Greek Grammar for the Use of Classical Students," "Critical History of Christian Literature and Doctrine from the Death of the Apostles to the Nicene Council," and "Expiatory and Substitutory Sacrifices of the Greeks."

DONALDSONVILLE, a town of Louisiana, capital of Ascension Parish, on the Mississippi River 64 miles above New Orleans. It is on the Texas and Pacific Railroad and is surrounded by a rice and cotton growing country. The industries include cotton mills, sugar works, tobacco factories, and machine shops. It has municipal waterworks and an electric light plant. The place was settled in 1760 and incorporated in 1806. Population, 1910, 4,090.

DONATELLO (dŏn-ä-tĕl'lō), or **Donato,** famous sculptor, born in Florence, Italy, in 1386; died Dec. 13, 1466. He belonged to the Donati family, among whose members were several scholars, and a number became doges of the republic of Venice. At an early age he became interested in art work and was instructed by Lorenzo Bicci. He was noted as a persistent worker, producing many excellent statues and a number of bas-reliefs. Among his sculptures are statues of Saint Mark, Saint Peter, Saint Michael, Saint George, and David. His larger works include "The Crucifixion," "The Baptism," and "Herod Receiving the Head of John the Baptist." An excellent equestrian statue was executed by him for one of the public squares of Padua.

DONATI (dō-nä'tē), **Giovanni Battista,** astronomer, born in Pisa, Italy, Dec. 16, 1826; died in Florence, Sept. 20, 1873. He was long connected with the Royal Institute at Florence and became the discoverer of Donati's comet in June, 1858. It is the most brilliant comet, next to the one of 1811, discovered in the last century. On Oct. 10, 1858, it was nearest the earth. See **Comet.**

DONELSON, Fort, an important fortification of the Confederates, on the Cumberland River, in the northwestern part of Tennessee. Grant moved his forces to the Cumberland and attacked Fort Donelson, after he had captured Fort Henry on the Tennessee, Feb. 6, 1862. The Confederates at first drove the Federal gunboats off, but General Grant's prompt action made it necessary for the fort to surrender. In a memorable letter General Grant demanded the surrender to be unconditional. About 15,000 Confederates were made prisoners and the fall of Nashville and Columbus became inevitable. General Wheeler made an attempt to recapture the place from the Federals on Feb. 6, 1863, with a force of 4,500 of Bragg's army. The garrison of the fort was held by 600 Federals, and by successful skirmishes the attack was delayed until a gunboat came up the river, causing the Confederates to withdraw.

DONGOLA (dŏn'gō-lä), a province of the Egyptian Sudan, in the eastern part of Nubia, on both sides of the Nile. The surface is level and fertile. Wheat, dates, and cattle are the leading exports. The inhabitants consist chiefly of a mixture of Nubians and Arabs. Mohammedanism is the chief religion. The province was settled by Mamelukes in 1812, after they had been expelled from Egypt, but in 1821 it was retaken by the Egyptians under Ibrahim Pasha. In 1886 a force of British and Egyptians under Kitchener quieted a rebellion, and since then the country has been enjoying an era of peace. Dongola, or El-Ordeh, the capital, is situated on the west bank of the Nile.

DONIPHAN, Alexander William, soldier, born in Mason County, Kentucky, July 9, 1808; died Aug. 8, 1887. He graduated at Augusta College, Kentucky, in 1826, was admitted to the bar, and began a successful practice at Lexington, Mo. In 1846 he entered the United States service against Mexico and was with Gen. Kearny in the expedition to Sante Fé, as colonel of the first regiment of Missouri mounted volunteers. The following year he marched against Chihuahua, where he was met by a superior force of Mexicans, but compelled that city to surrender. He was three times elected to the Missouri Legislature, in 1836, in 1840, and in 1854, and was a member of the peace convention in Washington, which convened to avert the Civil War.

DONIZETTI (dō-nē-dzĕt'tē), **Gaetano,** noted Italian composer, born in Bergamo, Italy, Sept. 25, 1797; died there April 8, 1848. He learned the elements of music in the lyceum of his native town, and studied advanced music under several masters. At the age of twenty years he entered the army. While garrisoned at Venice, he produced several excellent operas, and after his discharge from the military service he devoted himself to opera writing. His reputation was made by several productions that were received with much applause at Naples and Paris. Among other distinctions, he received appointments at the courts of Vienna and Naples, but persistent work affected his mind. Among his masterpieces are "The Martyrs,"

"Daughter of the Regiment," "La Favorita," and "Linda di Chamounix."

DON JUAN (dŏn jū'ạn), a personage of mythical origin, first alluded to in the legends and writings of Spain, but later currently mentioned in most European countries. It is represented that he descended from a historic family resident at Seville in the time of Peter the Cruel. The life he led was one of cruelty, dissipation, and lawlessness. In an attempt to abduct Giralda, the daughter of the governor of Seville, he was intercepted by her father, but subsequently slew him in a duel. Some time after the interment of the slain man, he visited his burial place and challenged his statue to follow him to a feast, which was promptly accepted. On appearing at the feast and meeting the guests, the animated statue carried Don Juan to the lower regions. In some dramas the plot is laid for his rescue, which finally succeeds, and he is induced to end his life with the severest penance in a monastery. The various stories form the groundwork of many popular dramas, novels, and poems, both in Spanish-speaking countries and in many others. Mozart's "Don Giovanni" is the most celebrated work based on Don Juan.

DONKEY (dŏn'kȳ). See **Ass.**

DONNELLY (dŏn'nĕl-lĭ), **Ignatius,** author and statesman, born in Philadelphia, Pa., Nov. 3, 1831; died in Minneapolis, Minn., Jan. 1, 1901. After securing an education in the schools of Pennsylvania he removed to Minnesota in 1857, and was elected Lieutenant Governor in 1859 as a Republican. He served as a member of Congress from 1863 to 1869. Shortly after retiring from Congress he devoted himself largely to writing his "Atlantis, the Antediluvian World," which appeared in 1882. Later he published "Ragnarok" and "The Great Cryptogram." In the latter he attempted to prove that the Shakespearean plays were written by Francis Bacon. In 1900 he was the candidate for President on the ticket of the People's party.

DON QUIXOTE (dŏn kwĭks'ōt). See **Cervantes.**

DORA D'ISTRIA (dō'rȧ dēs'trê-ȧ), the pseudonym of Helen Ghike, Princess Koltzoff Massalsky, a celebrated writer of Rumania, born in Bucharest, Jan. 22, 1828; died Nov. 22, 1888. After receiving an education in her native city, she devoted herself to the study of modern and ancient languages and literature. The "Iliad" was translated by her into German when she was only fifteen years old. After traveling extensively through Europe, she married the Russian prince Koltzoff Massalsky. Her numerous magazine articles and literary productions attracted much attention in a number of countries. She was honored by admission to several scientific and learned societies, and was adopted as a Grecian citizen by the legislature of Greece in 1867. Among her most famous works are "Heroes of Rumania," "On Women by a Woman," "Monastic Life in the Oriental Church," and "Women in the Orient."

DORCHESTER (dôr'chĕs-tẽr), a city of New Brunswick, capital of Westmoreland County, at the junction of the Memramcook and Petitcodiac rivers. It is nicely situated on Shepody Bay and the Intercolonial Railway, 115 miles northeast of Saint John, and is important as a port of entry. Coal and building stone are obtained in the vicinity. It has shipbuilding yards and is the seat of the penitentiary of the Maritime Provinces. Among the prominent buildings are several fine schools and churches, and it has electric lights and other public utilities. Population, 1906, 7,108.

DORDRECHT (dôr'drĕkt), or **Dort,** a city of the Netherlands, in the province of South Holland, ten miles southeast of Rotterdam. It is located on an island in the Meuse River, and has extensive transportation facilities by canals and railways. A large Gothic church, a public library, a theater, and several fine schools are among the chief buildings. The industries include flouring mills, shipyards, sugar refineries, tobacco factories, and iron and salt works. Dietrich III. of Holland founded the city in 1018, and its commercial importance is due largely to its membership in the Hanseatic League. It was the seat of the Synod of Dort in 1618, by which the doctrines of Calvin were affirmed. Population, 1917, 46,295.

DORÉ (dô-rȧ'), **Paul Gustave,** eminent designer and painter, born in Strassburg, Germany, Jan. 10, 1833; died in Paris, Jan. 27, 1883. His education was secured under leading masters of the arts in Paris, and he displayed more than ordinary skill as a student. At first he contributed various sketches to magazines and periodicals, but later began book illustrations. His reputation was spread to many countries by his characteristic illustrations of "Rabelais" in 1854 and of Sue's "Wandering Jew" two years later. In 1861 he received the decoration of chevalier of the Legion of Honor and was made an officer in 1879. Doré galleries were opened in London, Vienna, and several other cities for the exhibition of his productions. The works produced by him give evidence of remarkable talent as a poet and artist. Among the most celebrated and best known illustrations are those of Milton's "Paradise Lost," "Don Quixote," "Dante's "Inferno," Poe's "Raven," "Fables of La Fontaine," "Travelers in the Pyrenees," and "Bible Illustrations." His "Christ Leaving the Praetorium" is considered his most important painting.

DOREMUS, Sarah Platt, philanthropist, born in New York City, Aug. 3, 1802; died Jan. 29, 1877. She married Thomas C. Doremus in 1821, a wealthy merchant, by whose help she was enabled to give charitable assistance to many worthy projects. Among the many enterprises receiving assistance from her are the mission for French-Canadian peasants, the House

and School of Industry for Poor Women in New York, and the Nursery and Child's Hospital. During the Civil War her attention was directed to the enterprise of giving aid to the sick and wounded of both the North and South. After the war she founded the Presbyterian Home for Aged Women, extended aid during the famine in Ireland in 1869, and founded several associations, including the Female Bible Society. Besides adopting several youths, she reared a family of nine children of her own.

DORIA (dō'rē-ä), a celebrated family of Genoa, having its beginning in the 12th century, and of which Andrea Doria was the most distinguished. He was born at Oneglia, Italy, Nov. 30, 1466, and adopted a military career. He entered the service of Francis I. of France at about the age of fifty years, and was given command of a fleet in the Mediterranean. In his military life he exemplified a spirit of independence, causing Francis to become irritated to such an extent that he ordered his arrest. However, Doria promptly entered the service of Charles V. of Germany, with whom he stipulated for the freedom of Genoa. In 1529 he was tendered the title of sovereign of Genoa, but instead aided in forming a constitution, which remained in force until 1815. His love of liberty and support of independent government caused him to be called "Father of Peace." He won decisive victories over the Turks at Coron and Patras in 1532, and later Tunis was conquered for Charles V. mainly on account of his decisive action. In 1539 he aided in a joint expedition against the Turks, and two years later in another against Algeria. He died highly respected in 1560.

DORIANS (dō'rĭ-ąnz), one of the two principal branches of the Greeks, the other being the Ionians. According to legend, they descended from Dorus, a son of Hellen, and made settlement in the Peloponnesus. Among the cities of importance founded by them were Argos, Sparta, and Messenia. Their colonies included Sicily, Crete, and settlements in Asia Minor. The dialect of the Dorians was harsh and rough, while the Ionian was mild and polished, yet some admirable features of the former caused it to enter largely into hymns and choruses. Their philosophy and character are visible in the Pythagorean school, which shows a strong attachment to the aristocracy. The Dorian architecture is distinguished by strong and unadorned pillars, while the Ionian pillars are slender and profusely decorated. See **Column.**

DORIC ORDER (dŏr'ĭk), the earliest and strongest of three Grecian orders of architecture. It is noted for its proportions being the same as that of a man; that is, the height of a man is about six times the length of his foot. In the Doric style the columns are six times the diameter. The simplicity and harmony in this order are remarkable, and render many of the excellent temples, such as those built to Mars, Minerva, and Hercules, celebrated on account of their long, unbroken lines. Simplicity marks the Doric capital, while the frieze and cornice are massive, but plain. See **Column.**

DORION (dō-rē-ôn'), **Sir Antoine Aimé,** statesman, born at Sainte Ann de la Perade, Quebec, Jan. 17, 1818; died May 31, 1891. He was educated at Nicolet College and in 1842 was admitted to the bar. In 1854 he was elected a representative in the Canadian Assembly for Montreal, serving until 1857, when he was chosen a member of the Dominion Parliament for Hochelaga. From 1872 until 1874 he represented Napierville. He was a member of the French-Canadian Liberal party, called the *Rouge,* and held many important positions in the ministry. Queen Victoria knighted him in 1877.

DORMANT (dôr'mąnt). See **Hibernation.**

DORMOUSE (dôr'mous), a rodent animal appearing to be intermediate between the squirrels and the mice. These animals inhabit all temperate and warm countries, but are most common in Eurasia and Africa, where twelve species are found. The fur is soft, the eyes and ears are large, the tail is long and hairy, and the fore limbs are short. In habits they are quite timid and in size are larger than a common mouse. The winter is spent largely in a dormant state, from which they have been named *dormice.* Their food consists of nuts, vegetables, and grains. They are easily domesticated and seem to enjoy moving about in a cage. During the warmer days of summer they are active in fields and woods laying up a store for winter, but in the rainy or cold seasons they lie curled up in their nests and sleep. The young, from three to four in number, are brought forth in the spring, and by winter are quite able to take care of themselves.



DORMOUSE.

DORR (dôr), **Thomas Wilson,** statesman, born in Providence, R. I., Nov. 5, 1805; died Dec. 27, 1854. He was admitted to the bar and practiced at Providence. Though elected as a Whig to the State Assembly, he soon became allied with the Democrats. The State was governed under an old charter granted by Charles II. in 1663, under which the right of suffrage was limited to persons owning $134 worth of real estate and the eldest son of such owners. After fruitless efforts in the Assembly, Dorr organized a party in 1841 by which he hoped to reform the laws of the State. Accordingly, a State convention was held at Providence on October 4. It submitted a proposed constitution to the people, which received a majority vote of the adult male citizens, but the

authorities decided that it was adopted illegally. In the meantime the Legislature called a convention to frame and submit a proposed constitution for approval by the voters, but it was rejected by a majority vote in 1842. Each party called a general election, one electing T. W. Dorr Governor and the other Samuel W. King. Both governors claimed proper authority, but the election of King was generally approved. Dorr resisted, was arrested, and sentenced to imprisonment for life. In 1847 liberty was granted to him under a general amnesty, and he was restored to his civil rights in 1851. The disturbance raised in the State is generally known as the Dorr Rebellion, and the parties conducting it were called suffragists. While the methods of Dorr were revolutionary, they were the means of securing a more equitable government in the State.

DORSEY (dôr'sĭ), **James Owen,** ethnologist, born in Baltimore, Md., Oct. 31, 1848; died 1895. He studied at the Theological Seminary of Virginia, was ordained as deacon, and was sent to the Dakotas as a missionary. He was recognized in an honorable way by many scientific associations, and was granted a gold medal by the Royal Italian Didactic Society. Among his publications are "Omaha Sociology," "Osage War Customs," "Indian Personal Names," "Siouan Phonology," and "Siouan Migrations."

DORTMUND (dôrt'mo͝ont), a city in the province of Westphalia, Germany, on the Ems River, about 48 miles northeast of Cologne. Its rapid growth the past several years is due to the development of large coal mines in the vicinity and the building of numerous railroads. Several thousand persons are engaged in mining, while as many more are employed in manufactures and railroad enterprises. Among the products are machinery, tobacco, porcelain, textiles, woolens, cigars, clothing, iron and steel utensils, and railroad cars. It has an interesting city hall, a large public library, and municipal baths and gymnasiums. The central railway station is an excellent building, and the churches and institutions of learning likewise include expensive and valuable structures. The city has well-paved streets, a large park, and many modern facilites, including electric lights, sewerage, and rapid transit. It was a member of the Hanseatic league and still has a large trade. Population, 1905, 175,577; in 1910, 214,333.

DOTHAN, county seat of Houston County, Alabama, on the Central of Georgia and other railroads. It is in a productive section and has a large trade in merchandise and extensive railroad industries. The chief buildings include the high school, courthouse, and Y. M. C. A. buildings. It was settled in 1890 and has been growing rapidly. Population, 1910, 7,016.

DOUAY (do͞o'ā), or **Douai,** the name by which the version of the Bible used by English-speaking Catholics is known. The translation was made by divines connected with the College of Douay, France, under the direction of Cardinal Allen, the founder of that institution. It is based on the Vulgate and is authoritative among Catholics, having received the sanction of the Pope and the approval of the Council of Trent. The Old Testament was published in 1609, about two years before the authorized edition of King James's Protestant Bible appeared. The New Testament now published with the Douay version of the Old Testament was first issued at Rheims in 1582. Both have been revised at different times.

DOUBLEDAY, Abner, general, born at Ballston Spa, N. Y., June 26, 1819; died Jan. 26, 1893. He graduated at West Point in 1842, served in the Mexican War, and was made captain in the war against the Seminoles. In 1861 he commanded the garrison at Fort Sumter, and on April 12 fired the first gun in defense of the fortification. He was promoted brigadier general in 1862 and assigned to the defense of Washington. Later he commanded on the Rappahannock, at Bull Run, Chancellorsville, Fredericksburg, and Gettysburg. In 1864 he commanded the southeastern forces, and the following year was promoted major general in the regular army, remaining in active service until 1873. Among a number of interesting books relating to the war he published "Gettysburg Made Plain," "Reminiscences of Forts Sumter and Moultrie," and "Chancellorsville and Gettysburg."

DOUBLE STARS, or **Binary Stars,** a pair of stars that revolve about each other, or both about a common center. Sir William Herschel discovered the first of these stars in 1803, and since a large number have been added to the catalogues, though the periods of revolution have been determined of only a few. About 10,000 apparently double stars have been catalogued, and it is reasonably certain that 250 are binary; that is, they have a revolution round their common center of gravity. It requires from five and one-half years up to perhaps a thousand to complete their periods of revolution, hence it is difficult to study them with any degree of precision. The double stars reveal a duplication of the spectral lines, hence they afford curious instances of contrasted colors. The color of the smaller star complements that of the larger one, the former being blue or green and the latter red or orange.

DOUGLAS, a city of Cochise County, Arizona, on the El Paso and South Western and other railroads. The surrounding country produces copper and cement. It has machine shops, cement works, and stock yards. The chief buildings include the high school and the city hall. Population, 1910, 6,437.

DOUGLAS (dŭg'lăs), a city of Great Britain, capital of the Isle of Man, on the east shore of the island, eighty miles northwest of Liverpool. It has several slaughterhouses and a large trade in merchan-

dise. An extensive breakwater and a lighthouse afford safety for steamships, with which regular communication is maintained with Belfast, Dublin, Liverpool, and Glasgow. Population, 1917. 23,530.

DOUGLAS, the name of an ancient and celebrated family of Scotland. The first member of the family mentioned in history is William of Douglas, who is generally assigned to the period between 1175 and 1213. "The Good Sir James," who fought at Bannockburn with Bruce, was a descendant from him. He not only served the cause of Scotland, but after the death of Bruce faithfully complied with his request in carrying the heart of that eminent Scot to the Holy Land. Among the descendants are William Douglas, Earl of Liddesdale, and Sir William Douglas, who ranked among the celebrated warriors and contestants for the Scottish throne. Prior to 1357 the Douglases had no higher title than knight, but in that year Sir William Douglas was made Earl of Douglas and by marriage became Earl of Mar. In 1371 he claimed succession to the Scottish crown in opposition to Robert II., the first of the Stuarts. His son James, who was recognized as second Earl of Douglas and Mar, was slain in the Battle of Otterburn in 1388, and the earldom of Douglas was bestowed on Archibald, Lord of Galloway, surnamed the Grim. The title succeeded from generation to generation to various personages bearing the name of Douglas until in 1646, when it passed to the third son of the first Marquis of Douglas, who was created Earl of Selkirk. At the present time the earls of Selkirk are the only representatives of the family, all others being now dormant or extinct.

DOUGLAS, Stephen Arnold, statesman, born in Brandon, Vt., April 23, 1813; died June 3, 1861. He was the son of a physician, who died when Stephen was two years old. He was educated among the hardships common to the early life of many great Americans, but attended the academy in Canandaigua, N. Y., three years. After working on a farm, he taught school, and at the age of twenty-one began the practice of law in Jacksonville, Ill. His success was assured from the first by reason of eminent ability and close application to his profession, and in 1835 he was elected attorney-general of the State. He became secretary of the State of Illinois in 1840 and judge of the State supreme court in 1841, and was elected to Congress as a Democrat in 1843, serving in that capacity until 1847, when he was elected to the Senate, serving until 1861.



STEPHEN A. DOUGLAS.

Douglas, owing to his unusual aptitude, was commonly called the "Little Giant," and ranked as one of the most influential leaders of his party. In Congress he actively favored the acquisition of the whole of Oregon, and was chairman of the Committee on Territories. He supported the compromise of 1850, promulgated the doctrine of popular sovereignty, and supported the famous Kansas-Nebraska bill. While opposed to slavery, he held that the right to restrict it to any part of the country was not vested in Congress. Accordingly, he became a strong opponent to the Wilmot Proviso, which provided for the prohibition of slavery in any Territory that might be acquired by the peace treaty with Mexico. As to slavery in the territories, he held that the settlers should decide for themselves, from which the expression *squatter sovereignty* originated.

The name of Douglas was presented as a candidate for President in the Democratic conventions of 1852 and 1856. In 1860 he received the nomination for President by the northern division of the Democrats, the southern nominating John C. Breckenridge. Though receiving much popular support from the people, only twelve electoral votes were recorded in his favor. He sympathized with the cause of the Union, supporting it by several addresses on the subject, but he did not live to witness the successful termination of the contest.

DOUGLAS, William Lewis, capitalist and public man, born in Plymouth, Mass., Aug. 22, 1845. He attended the public schools and began work in the shoe shop of his uncle at an early age. Later he was employed in the cotton mills at Plymouth, and in 1876 opened a small shoe shop at Brockton, Mass. From this humble beginning he was able to build up one of the largest shoe factories in the world, with a capacity of about 20,000 pairs of shoes per day, and in addition established about 75 retail shoe stores in large cities. In 1883 he was elected a member of the Massachusetts House of Representatives, was reëlected several times, and became mayor of Brockton in 1891. He was chosen Governor of Massachusetts as a Democrat in 1904, but declined to be a candidate for a second term. He was a delegate to many Democratic national conventions.

DOUGLASS, Davis Bates, noted engineer, born in Pompton, N. J., March 21, 1790; died Oct. 19, 1849. He graduated at Yale in 1813, became a member of the government corps of engineers, and was given charge of the sappers and miners at West Point. He took part in the battles of Niagara and Lundy's Lane, effected the repair of Fort Erie, and was promoted captain. After resigning from the service in 1831, he was appointed chief engineer of the Morris Canal Company, New Jersey, in which he introduced the use of inclined planes

instead of locks. Later he was identified with the construction of the Croton aqueduct, engineered the Greenwood Cemetery, Brooklyn, and designed the supporting wall for Brooklyn Heights. Among other important positions, he held chairs at West Point; in the University of New York; Hobart College, New York; and Kenyon College, Ohio.

DOUGLASS, Frederick, orator and statesman, born in Tuckahoe, Md., in February, 1817; died in Washington, D. C., Feb. 20, 1895. His mother was a negro slave and his father a white man. Though kept as a slave on the farm of Edward Lloyd until ten years old, he was sent to live as a waiter with a relative of his master in Baltimore, where he learned to read and write. A Boston shipbuilder purchased him in 1832, for whom he became a waiter and later a ship calker. He escaped from slavery in 1838 and settled at New Bedford, Mass., and began to develop ability as a speaker and writer. The American Anti-Slavery Society engaged him as a lecturer, in which capacity he attracted considerable attention and was greeted by large audiences. He visited England in 1845, where he was well received and shown much courtesy. His friends in England collected $750, with which his legal emancipation was purchased from his former master. He established two weekly newspapers at Rochester, N. Y. In 1870 he published the *New National Era* in Washington, and a year later was appointed secretary of the commission to Santo Domingo. The Republicans named him as a presidential elector from New York in 1872, and in 1877-81 he served as United States marshal in the District of Columbia. In 1884 he married a white woman. President Harrison appointed him minister to Hayti in 1889, and the Haytian government made him a commissioner to the Columbian Exposition. Among his writings relating to slavery are "My Bondage and My Freedom" and "Narrative of My Experience in Slavery."

DOUM PALM (dōōm). See **Palms.**

DOURO (dō′rōō), a large river of the Spanish peninsula, rises in the northern part of Spain, and flows west through a portion of Spain and the whole of Portugal. The entire course is 500 miles and the most important tributary is the Pisuerga. Owing to rocks and sand banks, only about seventy miles are navigable. The mouth of the river is three miles below Oporto, where it flows into the Atlantic Ocean.

DOVE (dŭv), a pigeon, especially the familiar species known as the *mourning dove* of North America and the *turtle dove* of Europe. Among the domestic doves are the tumblers, fantails, and carrier pigeons. In poetry the dove is regarded a symbol of gentleness, while in Christianity it typifies the Holy Spirit. See **Pigeon.**

DOVER (dō′vĕr), the capital of Delaware, county seat of Kent County, about eight miles west of Delaware Bay, on the Philadelphia, Wilmington and Baltimore Railroad. It is located on elevated ground and has well-improved streets. In the State capitol, which is the largest building in the city, is a library of 35,000 volumes. Other noteworthy features include the county courthouse, the post office, the high school, and the Wilmington Conference Academy. It has a number of monuments dedicated to prominent men of the Revolution. The manufactures consist of flour, canned fruits, glass, clothing, vehicles, and machinery. The surrounding country is largely devoted to fruit growing. Electric car lines furnish ample means of conveyance. It was made the State capital in 1777 and was incorporated in 1829. Population, 1900, 3,329; in 1910, 3,720.

DOVER, county seat of Strafford County, New Hampshire, on the Cocheco River, ten miles northwest of Portsmouth. It is on the Boston and Maine Railroad. The streets are broad and well paved. Among the chief buildings are the courthouse, the public library, the town hall, the opera house, the Joseph's Hill School, and the Franklin Academy. The manufactures include boots and shoes, cotton and woolen goods, machinery, earthenware, and prints. It has waterworks, sewerage, and electric street railways. Dover is one of the oldest cities in the State, dating from about the middle of the 17th century. It was incorporated in 1855. Population, 1900, 13,207; in 1910, 13,247.

DOVER, a town of New Jersey, in Morris County, 27 miles northwest of New York City. It is located on the Rockaway River, the Morris Canal, and the New Jersey Central and the Delaware, Lackawanna and Western railways. The manufacturing enterprises include iron works, machine shops, knitting and silk mills, and stove and range works. It has a fine system of waterworks and a number of good schools. Several summer resorts and a national powder depot are near the town. The first settlement was made in its vicinity in the middle of the 18th century. It was incorporated as a town in 1869. Population, 1910, 7,468.

DOVER, an important seaport of England, on the Strait of Dover, about sixty miles southeast of London. It is the nearest to France of the English seaports, being only twenty-one miles from the French coast. Numerous railroad lines join it with the interior cities, while electric railways furnish ample urban and suburban connections. Among the noteworthy buildings are the churches of Saint James and Saint Mary, the Dover College, the public library, and the town hall. The Castle of Dover, located on the chalk cliffs east of the city, was founded by the Romans. It has extensive systems of waterworks, sewerage, and stone and macadam pavements. The manufactures include fabrics, soap, machinery, clothing, and food products. Its harbor has been put

in excellent condition by recent improvements, while the Admiralty Pier protects the entrance. The city and surrounding districts are rich in relics of ancient times. Population, 1917, 43,-792.

DOVER, Strait of, the sea channel which separates England from France, and connects the English Channel with the North Sea. The length is 24 miles. It is 25 fathoms deep at the time of the spring tides. The narrowest point is at Dover, where it is 21 miles wide. Chalk cliffs are more or less prevalent on both sides, and indicate that at remote ages Great Britain was connected with the mainland. The strait is the site of an important commercial life.

DOW, or **Dou, Gerard,** famous painter, born at Leyden, Holland, in 1613; died there in 1675. He received his early instruction from Dolando, a draughtsman, and subsequently studied under Rembrandt. His works excel in delicacy and harmony of coloring and are considered gems of art. About 200 paintings extant are attributed to him. Some of them have been sold at very high prices and are in the leading collections of Europe. Among the most noted are "The Village Grocer," "The Dentist," "The Interior of a Household," "The Charlatan," "The Fiddler," and "The Dropsical Woman."

DOW, Neal, temperance reformer, born in Portland, Me., March 20, 1804 died in the same city Oct. 2, 1897. After being educated at Friend's Academy, New Bedford, Mass., he located in his native town, where he was elected mayor in 1851 and was reëlected five years later. Through his efforts the Maine prohibitive liquor law was passed in 1851. He served as a member of the State Legislature in 1858-59 and accompanied General Butler to New Orleans as colonel of the thirteenth Maine volunteers, rendering efficient service in the Civil War. He was taken prisoner in 1863 and was exchanged the following year, after which he resigned. Dow is best known by his able and persistent work as a temperance lecturer and reformer. In 1880 the Prohibition party nominated him for President of the United States, for which office he received 10,305 of the popular vote.

DOWDEN (dou'dẹn), **Edward,** scholar and critic, born in Cork, Ireland, May 3, 1843. He studied at Trinity College, Dublin, and became professor of oratory in the same institution, but was soon transferred to that of English literature. In 1900 he was made secretary of the council of Trinity College. The Cunningham gold medal of the Royal Irish Academy was awarded to him. His writings are very numerous, including a history of French literature and critical works on Shelley and Wordsworth. Among his books are "Studies in Literature," "Romeo and Juliet," "The Shakespeare Primer," "The Passion Pilgrim," and "Southey's Correspondence with Caroline Bowles." He died April 4, 1913.

DOWIE, John Alexander. See **Christian Catholic Church.**

DOWNING (doun'ĭng), **Andrew Jackson,** landscape gardener, born in Newburgh, N. Y., Oct. 31, 1815; died July 28, 1852. His interest in landscape gardening was early developed by aiding his brother in the establishment of a nursery. He erected a beautiful country residence in 1838, and was considered authority on beautifying and modeling residences. In 1850 he visited Europe to study gardening, and the following year was appointed commissioner to lay out the public grounds in Washington, D. C. When sailing from his home to conduct the work, the steamer took fire on the Hudson river, and his personal efforts in endeavoring to save others resulted in his drowning. Downing was for some years editor of the *Horticulturist,* and published works entitled "Landscape Gardening," "Cottage Residences," and "Fruit and Fruit Trees of America."

DOYLE (doil), **Arthur Conan** author, born in Edinburgh, Scotland, May 22, 1859. He studied at Stony Hurst College and in Germany, and took a medical course of instruction after returning to Edinburgh. Before graduating, he made a trip to the Arctic regions, where he spent four months as surgeon of a whaling crew. He practiced medicine at Southsea for eight years, devoting his leisure to literary work. Many of his productions have been translated into various languages. He is known in America by his writings and by a number of lectures delivered while making an extensive tour through the United States and Canada. During the Boer War he visited South Africa and in the meantime wrote a defense of the British policy in that region. For this service to the government he was knighted in 1902. Among his best known productions are "A Study in Scarlet," "The Firm of Girdlestone," "Reminiscences," "Round the Red Lamp," "Rodney Stone," "The Great Boer War," "The Adventures of Sherlock Holmes," "The Stark Munro Letters," "The Green Flag," and "The Return of Sherlock Holmes."



ARTHUR CONAN DOYLE.

DRACHMA (drăk'mà), or **Drachm,** the name of a silver coin and of a measure of weight in ancient Greece. The measure of weight was composed of six *oboli,* or a handful. A *mina* contained 100 drachmas and a *talent* contained 1,000. As a unit of weight it varied somewhat at different times, from 6 to 6.5 grams. The *silver drachma* had a value of

from 15.20 to 17.05 cents. The drachma is the name of a silver coin now used in Greece. It has the same value as the franc of France. The dram, a unit of the apothecaries' weight, contains three scruples, or sixty grains.

DRACO (drā'kō), a lawgiver of Greece, one of the most eminent of Athens, who was appointed in 621 B. C. to prepare a code of laws. It is probable that he merely codified the laws then existing in a disordered state. His code of laws provided the penalty of death for most offenses, on account of which their enforcement was neglected on many occasions. It is said the great lawgiver died from stifling while at Aegina as the result of having a cloak thrown about him by the populace as a mark of respect. His laws were changed considerably by Solon, though the death penalty for murder was retained. The work of Draco was important, since it largely limited the power of the archons, who were then in control of the government, and gave the state an eminence.

DRAFTING, or **Conscription,** the system or method of enlisting men for military service under compulsion. In modern times drafting men for the army has been resorted to only in cases of emergency, especially when the country was involved in a formidable military contest. The modern system is based upon the military constitution of ancient Rome, where conscription was resorted to each year as a means to recruit the army. In most countries of Europe military service is obligatory on every man of sound mind and normal physical development. The United States enacted a compulsory service law at the time of the Civil War, when President Lincoln recruited the Federal armies by levying drafts of men. In July, 1863, when the Union was in need of more soldiers, such a conscription act caused a riot in New York, known as the Draft Riots. Both Canada and the United States resorted to draft laws in 1917. In the latter country this law applied to all males between the ages of 21 and 31 years and under it 9,683,445 men were registered.

DRAGON (drăg'ŭn), the name applied to several species of lizards found in South America, Asia, and Africa. The flying lizard is the best type of the genus. It is about ten inches in length, has a long tail, and is entirely harmless. On each side the skin is expanded in the form of a parachute, enabling it to make long leaps in passing from branch to branch, though it cannot fly in the ordinary sense. Most species live in trees and feed almost entirely on insects, which they catch with much skill.



FLYING DRAGON.

The name *dragon* applied in mythology to an animal or serpent of abnormal form. This fabulous animal is represented as serving various purposes, among them watching the garden of the Hesperides, and whose destruction was included with the seven labors of Hercules. In various paintings the dragon has the form of a winged crocodile, and is said to have dwelt in caves among cliffs and mountains. The fossils of the pterodactyl found in the rocks of the Mesozoic time show some resemblance to the flying dragon of mythology.

DRAGON FLY, the popular name of a large number of insects which are widely distributed, including not less than 2,000 species, of which about 300 occur in North America. They have a large, broad head loosely attached to the thorax. Their eyes are prominent, often meeting upon the crown of the head. The horny mandibles are toothed, the wings are closely articulated, and in many species the hind wings are about the same size as the anterior. They are remarkable for their voracity and feed on insects, which they catch with much skill. They deposit their eggs on plants growing beneath the surface of water, where the larvae and pupae lead an aquatic life. Their larval state occupies a year, after which the skin bursts along the back and the developed insect makes its appearance. Many species are from two to three inches long, of numerous colors, and not dangerous in any way. The common dragon fly of North America is known as the *devil's darning-needle.* About 75 species of fossil dragon flies have been described, appearing in the Lias and more recent formations.



DRAGON FLY.

DRAGON TREE, a tree native to the Canary Islands. The stem is usually short in

proportion to its thickness, and the short branches terminate in tufts of sword-shaped leaves. A celebrated specimen on the island of Teneriffe, near Orotava, was visited by Humboldt in 1799 and had a stem over forty feet in circumference. It yields a resinous substance known as *dragon's blood,* but this product is also obtained from a number of other trees, including several species native to the East Indies and North and South America. This product is a colorless and tasteless substance, and is used in the preparation of varnishes and lacquers.

DRAINING (drān'ing), a term applied extensively in agriculture to the process of drawing off superfluous water by artificial means. Through the agency of draining, large tracts of otherwise wet and waste lands have been rendered susceptible to cultivation and the production of plants and cereals. The common way in extensive flats is to excavate a great open channel or ditch, through which the water passes off freely after rains or the melting of snow or ice. Lands used for cultivation are usually drained by the construction of tile drains. The common draintile is manufactured of clay, is circular in form, commonly twelve inches long, and has an inside diameter measuring from three to fifteen inches. The larger sizes, which range from eighteen to forty inches in diameter, are generally made two feet long, either of clay or concrete. In order to construct a proper tile drain it is necessary to make a careful survey of the district to be drained, forming an estimate of the approximate amount of water to be carried from the region, and locate the tile so a proper fall will insure the unobstructed passage of the water. A complete system of drainage requires a number of minor drains or laterals, which carry the water to the main drain. The number of such laterals depends upon the character of the surface and the nature of the soil, since a hard clay soil is not so easily penetrated by the moisture as the loose and sandy formations.

In the colder countries the tile drain should be sufficiently deep to be below the frost in the winter, else water freezing within will burst the tile and impair the drain. The best drains are at least four feet deep at the shallowest places, which necessitates placing them at great depths through moles or hills. It has been found that the system of draining lands, though quite expensive in some cases, is a profitable investment, owing to the fact that the lands redeemed are usually the richest and most fruitful. Tile factories are operated in practically all of the states where drainage is necessary and the proper clays are found. By the use of this method the amount of arable land has been increased largely. There are other forms of drainage, such as open ditches made by plows, layers of stones covered by earth, and perforated drainpipe of circular sections covered by stones and earth, but the most common is the one employing tiles made of clay or concrete.

DRAINAGE CANAL. See **Chicago Drainage Canal.**

DRAKE, Friedrich Johann Henrich, sculptor, born at Pyrmont, Germany, June 23, 1805; died April 6, 1882. He was the son of a turner and served in the shop of his father as an apprentice, but at an early age began to show an inclination to study art. In 1827 he began to study sculpturing under Rauch and later studied under Thorwaldsen in Italy. Among his early works is a group entitled "The Dying Warrior," completed in 1833, and his "Madonna and Child," made about the same time, was purchased by the Empress of Russia. The marble statue of Frederick William III., in the Berlin Thier Garten, is one of his best productions. In 1867 he completed the colossal bronze statue of King William of Prussia, which was adjudged the greatest product of modern sculpture at the Paris Exposition, in recognition of which he received the great gold medal of the Legion of Honor. He executed many busts and statuettes, including those of Bismarck, Rauch, Schiller, Goethe, and Von Moltke. Many academies and institutions of learning admitted him to membership, including those located at Rome, Munich, Paris, Antwerp, and Saint Petersburg.

DRAKE, Joseph Rodman, poet, born in New York City Aug. 7, 1795; died Sept. 21, 1820. His parents died while he was a boy, and his early livelihood depended upon his own resources. He engaged in business for some time and later studied medicine. In 1812 he became associated with Fitz-Greene Halleck and was a friend of James Fenimore Cooper. His longest poem is "The Culprit Fay," written when he was 22 years old, and his best known poem, "The American Flag," the four concluding lines of which were written by Halleck. He was for some time a writer for the New York *Evening Post* and contributed many witty poems to that periodical. His death at an early age was caused by consumption of the lungs.

DRAKE, Sir Francis, famous navigator, born in Devonshire, England, about 1540; died in the West Indies, Jan. 28, 1596. He was the son of a yeoman and was apprenticed to a neighbor, who had a vessel with which he made voyages to France and Zealand. When his master died, he fell heir to the ship and conducted a successful trade. He learned of the success of Sir John Hawkins in America, and, selling his ship, he joined that voyager at Plymouth and accompanied him on an expedition to Mexico. He obtained a commission from Queen Elizabeth in 1570, cruised on the coast of the West Indies, and enriched himself by plundering Spanish settlements. Soon after he crossed the Isthmus of Panama, where he beheld the Pacific Ocean for the first time. He returned to Plymouth in 1573 with great

wealth and attracted the attention of the anxious and interested people.

In 1577 Drake sailed with five vessels to South America and plundered many of the Spanish settlements. Subsequently he entered the Pacific Ocean and cruised on the coast of Chile and Peru, and, sailing northward, he claimed California for the British. After spending some time in the vicinity of San Francisco Bay, he sailed across the Pacific to the Moluccas, crossed the Indian Ocean, and doubled the Cape of Good Hope. On reaching Plymouth in 1579, he was received with distinction, while the queen came to his vessel to partake of a banquet and confer upon him the honor of knighthood. Subsequently Drake spent two years preparing a fleet of twenty-one vessels with which to sail against Philip II. of Spain in South America and the West Indies. His voyage proved profitable. Later he visited the newly planted colony of Virginia. It is said that he brought both the potato and the tobacco plant with him to England on his return home.

When the great Spanish Armada was building to invade England, Drake was commissioned by Elizabeth to sail with a fleet of thirty vessels and destroy the enemy's ships. He entered the port of Cadiz in April, 1587, where he destroyed one hundred vessels and took possession of much booty. The following year he was made vice admiral under Lord Howard, and with a fleet broke the naval supremacy of Spain, scattering the Armada. His next expedition was directed against the Spaniards in Portugal, where they had taken possession, but the enterprise was not particularly successful. On returning to Plymouth, he was elected a member of Parliament. His last voyage was made in 1595, when he joined Sir John Hawkins in an expedition to the West Indies for the purpose of destroying the Spanish settlements. Hawkins died before reaching Porto Rico and Drake was repulsed in attacking the place. A disease shortly after broke out among the soldiers and sailors, of which he himself died, and his body was lowered in the sea near Puerto Bello.

DRAKENSBERG (drä'kęns-bĕrg), an elevated range of mountains in South Africa, extending through the eastern part of Cape Colony and along the borders of Natal and the Orange River Colony. Champagne Castle, one of the highest peaks, has an elevation of about 11,500 feet. Several railroads cross through its passes. During the Anglo-Boer War it was the scene of many battles.

DRAKE UNIVERSITY, a coeducational institution at Des Moines, Iowa, the largest independent endowed institution of higher learning in Iowa. It was organized in 1881. The chief benefactor, Gen. Francis Marion Drake, made a gift of $20,000 to establish it. Afterward he made other donations at different times, the total amount of his gifts aggregating nearly $250,000. As a mark of appreciation of his beneficence the institution was named Drake University. Another leading spirit in the founding of the university was George Thomas Carpenter, the first president, who was made chancellor and held that office until his decease, in 1894. Barton O. Aylesworth succeeded him as president, but resigned in 1897, when William Bayard Craig was chosen chancellor. He was succeeded in 1903 by Hill McClelland Bell, under whose presidency the institution has made phenomenal growth in resources and attendance.

The chief buildings include the Main Building, the Auditorium, Science Hall, the University Church, Howard Hall, the Medical Building, Cole Hall, Memorial Hall, and the Carnegie Library. Six colleges have been established in the university, the College of Liberal Arts, College of the Bible, College of Law, College of Medicine, College of Education, and College of Music. In the College of Liberal Arts, the work is largely elective, leading to the three degrees of A. B., Ph. B., and B. S. The library has a capacity of 150,000 books, a hall of history, and a number of rooms for officers and for recitations. Drake University, in 1918, had 110 instructors and 1,675 students.

DRAMA (drä'mȧ), a literary production which embodies a picture of real life and is to be represented on a stage by action. There are two principal classes of dramas, tragedy and comedy, with a number of minor kinds, such as the farce, burlesque, tragic comedy, and melodrama. A *tragedy* is a production intended to interest the mind in the highest degree, while a *comedy* is designed merely for amusement and merriment. The others are mixtures of the two chief classes, and alternately seek to interest, instruct, and amuse. Dramatic performances of some kind are found among all peoples, and their origin is to be attributed to the love of imitating the actions of others or of some deified personage. The Old Testament contains a number of compositions that partake of a dramatic nature, among them numerous dialogues in the Book of Job and the lyric poems in the Song of Solomon.

The dramatic literature in ancient India and China was particularly characteristic, each country possessing a drama peculiar to itself. The Greeks originated the European drama in both the tragic and comic forms. It is thought that the first comedy was given by Susarion and Dolon in Athens on a movable scaffold in 562 B. C. The first production in tragedy was from the pen of Thespis in 536 B. C. Aeschylus introduced dresses on the stage, by which means the imitation of action was rendered much more natural. The three greatest writers of tragedy in Greece are Aeschylus, Sophocles, and Euripides, while Aristophanes is the most eminent writer of comedy. In Rome the early

drama was derived from the Greeks, though it never attained to so high a degree of perfection, even under Terence and Plautus, the most celebrated of Roman writers of comedy, and Andronicus, the writer of tragedy. The only dramas of ancient Rome extant are a few specimens coming to us from Seneca.

The drama of modern European countries took rise in the moralities, miracle plays, and masterpieces of the Middle Ages, though the Italian drama began with the reproduction of classical models. Performances at banquets became common in most countries in the 12th century, and later scenes from the Bible were acted on stages in churches by priests and their assistants. The morality plays were fables, in which impressive moral lessons were recited with the view of overcoming vice and its baneful influences. Among the celebrated Bible plays is the famous Passion Play, illustrating the life of Christ, which is still counted among the most interesting and popular of the sacred dramas. In the 18th century the Italian drama took a new form of interest, both in comedy and tragedy, the later writers including Monti, Goldoni, Alfieri, and Manzoni. The other nations developed a taste for dramatic art much later than Italy. Spain followed Italy, reaching its acme in dramatic art through the works of Calderon and Lope de Vega, while the English reached their climax in Shakespeare.

The first period in the history of English drama begins with the reign of Elizabeth and terminates with that of Charles I. Within this time Shakespeare, Ben Jonson, Beaumont, Greene, Marlowe, and Fletcher were among the brilliant dramatists The second period began with Charles II., including among its best writers Otway, Lee, Wycherley, Congreve, and Dryden. At first the plays of the latter period were marked by inferior productions, but later notable changes were made for the better. The most noted of English writers of more recent time include Coleridge, Shelley, Byron, Lord Lytton, Browning, and Tennyson. However, Shakespeare stands preëminent among the English dramatists and his plays are still more popular than those of any other English writer. Goldsmith's "She Stoops to Conquer" and Sheridan's "The School of Scandal" are very noteworthy. In France the drama was greatly improved by the advent of Corneille, who is regarded the founder of the higher drama in that country. Among the most distinguished of the later French dramatists are Hugo, Racine, Voltaire, and Molière.

The German drama was at first largely instituted by adaptations from the Italian and French, but scholarly additions were made by Lessing in 1755. He was followed by Schiller and Goethe, who rank among the best dramatists of modern times, the latter being regarded equal to Shakespeare by many critics. Schiller's "Wilhelm Tell" and Goethe's "Faust" and "The Sorrows of Werther" hold the stage with unceasing interest. Other noted German dramatic writers are Brentano, Körner, Schlegel, Ludwig, Freytag, Laube, Kotzebue, and Von Moser. Hermann Sudermann, author of "Johannesfeuer," is one of the most recent German dramatists. The Dutch drama had its rise in the 17th century by the classical tragedies of Koster, and reached its acme in Vondel. Among the chief Scandinavian dramatists are Heiberg, Ibsen, Oehlenschläger, and Björnson.

The American drama originated by amateur players at Quebec, Canada, in 1694, though it is likely that the Spaniards introduced the stage in Mexico at an earlier date. Puritans looked upon dramatic art with disfavor and passed a law whereby players and spectators were fined five dollars on conviction of having participated in performances. This law was in force for fifty years. A company attempting to give a performance at Philadelphia in 1749 was bound over to their good behavior. The originators next went to New York, where they gave performances for sixteen months consecutively, the advertisement including "The Historical Tragedy of King Richard III., Wrote Originally by Shakespeare, and Altered by Colley Cibber, Esq." In the beginning of the 19th century the drama came into general popularity, first in the larger cities and later in towns and villages. John D. Burke, slain in a duel in 1808, wrote the successful plays, "Joan of Arc" and "Bunker Hill." John H. Payne, author of "Home, Sweet Home," wrote sixteen plays, while both George P. Morris, author of "Woodman, Spare That Tree," and Samuel Woodworth, author of "The Old Oaken Bucket," wrote numerous masterpieces. Among the noted American dramatists are Epes Sargent, W. E. Burton, and John Brougham. Denman Thompson's "Old Homestead" and Harriet Beecher Stowe's "Uncle Tom's Cabin" have been played more extensively than any others.

DRAPER (drā'pēr), **Andrew Sloan,** educator, born in Westford, N. Y., June 21, 1848. He studied law at Schenectady and practiced that profession at Albany. In 1881 he was chosen a member of the State Legislature, and served as judge of the United States court of Alabama claims in 1884-86. He was a member of the school board of Albany, superintendent of public instruction in New York, superintendent of the schools at Cleveland, Ohio, and regent of the University of Illinois. Among his numerous writings are "The Powers and Obligations of Teachers," "American Schools and Citizenship," "A Teaching Profession," "The Authority of the State in Education," and "The Rescue of Cuba." He died April 27, 1913.

DRAPER, Henry, scientist, son of J. W. Draper (q. v.), born in Prince Edward County, Virginia, March 7, 1837; died in New York, Nov. 20, 1882. He was educated at the University of the City of New York, in which he

became professor of physiology in 1860, and later was made dean of the medical faculty. He made an extensive tour through Europe, studying en route, and resided at Hastings-on-the-Hudson after his return to America. Congress appointed him to observe the transit of Venus in 1874. He announced the discovery of oxygen in the sun by photography in 1877 and promulgated a new theory of the solar spectrum. Among his writings are "Changes of Blood Cells in the Spleen," "A Text-Book of Chemistry," and "On the Construction of a Silver Glass Telescope."

DRAPER, John Christopher, physician, son of John William Draper, born in Prince Edward County, Virginia, March 31, 1835; died Dec. 20, 1885. He graduated at the University of New York, where he was professor of analytical chemistry in 1858-71. He was made professor of natural science in the College of the City of New York, and was for a time professor of chemistry in the medical department of the University of New York. Besides contributing to a large number of scientific journals, he published useful books on chemistry and medicine. They include "A Text-Book of Medical Physics," "Anatomy, Physiology and Hygiene," and "A Practical Laboratory Course in Medical Chemistry."

DRAPER, John William, American writer and chemist, born near Liverpool, England, May 5, 1811; died at Hastings-on-the-Hudson, N. Y., Jan. 4, 1882. He took a course in chemistry at the University of London, emigrated to the United States in 1832, and pursued advanced studies in the medical department of the University of Pennsylvania. In 1836 he became professor of chemistry and philosophy in Hampden-Sidney College, Virginia, and two years later was made professor in the University of New York. In 1840 he was chosen president of the medical department of that college, which position he held 33 years. He made many discoveries in chemistry by means of experimental investigation. He found a way to obtain accurate photographic representations of the moon's surface, contributed to the knowledge of prismatic and spectrum analysis, and successfully photographed the diffraction spectrum. Many learned societies extended honors to him. Among his writings are "Forces that Produce the Organization of Plants," "History of the Intellectual Development of Europe," "Thoughts on the Future Civil Policy of America," "History of the Conflict between Religion and Society," "History of the American Civil War," "Text-Book in Natural Philosophy," and "Human Physiology."

DRAVE (drä'vę), an important river of Europe, rising in the eastern part of the Tyrol. Its course is through Carinthia, Styria, and Croatia. It forms the boundary between Hungary and Slavonia, after which it joins the Danube a few miles east of Eszek. The entire length is 450 miles, about half that distance being navigable. The valley traversed by it is well populated and noted for its great fertility. Marburg, Lienz, and Eszek are among the cities on its banks.

DRAVIDIANS (drȧ-vĭd'ĭ-ȧns), the name applied to a group of non-Aryan races in the southern part of India. They include the people who speak a number of dialects, including the Canarese, Malayālam, Tamil, Telugu, and a number of others. The Dravidian languages show no affinity to the Aryan or Indo-Germanic, except that these tongues have been modified on account of contact with the Sanskrit. About twelve or fourteen dialects are spoken and some of these are intelligible to two or more of the different members of the group, but most of them speak only one dialect. The Tamil and Telugu show the highest degree of culture and are the dialects of about one-half of these Dravidian people.

DRAWING (drą'ĭng), the art of delineating the forms of objects on a flat surface by means of lines drawn with a pen, crayon, pencil, or some similar object. It is taught as a branch of study in many of the common schools and colleges, and is employed in making charts and maps. Architects employ drawing in preparing plans and views of buildings, machinery, and figures. In *geometrical* and *mechanical* drawing instruments are used to guide the hand, while *freehand* drawing is done from objects without an artificial guide, as the name indicates. Mechanical drawing includes *topographical* drawing, *ship draughting,* and *architectural* drawing. Another class of drawing, the *perspective,* aims to represent the aspect of an object from a given point of view as it appears to the eye. It approaches the artistic or freehand drawing in its results. This branch of instruction has proved of inestimable value and is an aid in determining relative proportions and forms. Paintings in water colors and sketches or colors in oils, in the arts, are usually called drawings. See **Painting.**

DRAYTON (drā'tŭn), **William Henry,** statesman, born at Drayton Hall, on the family estates in South Carolina, in 1742; died Sept. 3, 1779. He studied at Westminster School and Baliol College, Oxford, England, and returned to South Carolina in 1764. Soon after he was admitted to the bar and wrote extensively on political topics. In 1771 he was appointed privy councilor for the province of South Carolina, but was suspended from his offices under the crown for publishing pamphlets in favor of the American cause. He was made a member of the council of safety and later became its president, and was presiding officer of the Provincial Congress in 1775. Later he served as a delegate to the Continental Congress. He wrote a work entitled "Memoirs of the American Revolution."

DREAMS, the ideas or images of a sleeping person, in which he seems to see things real

and substantial. Dreams are accounted for by some writers as resulting from uninterrupted trains of ideas passing through the mind at all times at night as well as by day, and as being modified and influenced largely by the thoughts of the objects in which the mind is engaged during the period of wakefulness. A man full of projects in business and perplexed with anxieties goes to bed with an active mind, which is excited even in sleep by the importance of his daily occupation. This leads to imperfect sleep and vivid dreams, which remain in the memory after awaking. Irregular meals, eating shortly before retiring, and other irregularities are prolific causes of mental activity during sleep, but the trend of the mind is influenced very largely by the activities experienced during the day.

In dreams the train of ideas appears as a series of events passing before the eye, or as objects affecting the senses. The periods in which dreams occur are often exaggerated, since what appears as a long period of time may be but a few minutes or seconds. The ideas seeming to pass before the eye may cover a brief period or extend over several years, though the actual time elapsing may be but a few minutes. Pleasurable dreams result to those who live a life of purity and experience an absence of remorse, while the contrary affect those whose minds are engaged frequently in evil thoughts and imaginations. There are cases on record where men claimed to be aided in professional and business engagements by the effect of mental activity during sleep. Benjamin Franklin expressed the view that during dreams he was instructed at various times regarding issues that were subject to mental study. Coleridge asserted that he composed several hundred lines of "Kubla Khan" during a dream and committed them to paper before he awoke.

DREDGING (drĕj'ing), a term applied by engineers to the process of excavating material under water and thereby improving the means of navigation. Many machines for this purpose have come into use, but they may be classed either as *dipper* or as *grapple* dredges. The former consist of spoons or scoops for scraping sand, mud, and silt from the bed of a stream, canal, harbor, dock, or some other body of water. On the other hand, the grapple dredges are fitted to close around solid earth or stone. In this way the landing places for vessels as well as channels and inlets are not only deepened, but are made safer and more serviceable for large vessels. The work is done by steam power applied to machinery. The deposits at the bottom of the water are torn up and raised sufficiently to be dumped into dredge boats, which carry them off, depositing them at some distance from the place to be deepened. The process of securing oysters, plants, and shells from the bottom of the water is usually called dredging. The common dredge for catching oysters consists of a scraper attached to an iron frame. A bag fastened to the frame at the rear of the scraper receives the oysters, from which they are taken after being landed on the shore or on boats. Naturalists employ an apparatus for securing specimens of marine forms for examination, which is constructed similar to that of an oyster dredge.

DRED SCOTT DECISION, a decision of the United States Supreme Court delivered by Chief Justice Taney on March 6, 1856, regarding a slave named Dred Scott. This slave was in the possession of an owner in Missouri. He was taken to Illinois and then to Minnesota, which was at that time a Territory. Illinois and Minnesota were then free soil, and on this Dred Scott was kept for a number of years, after which he was taken back to Missouri. After the death of Dr. Emerson, the claimant of the slave, Dred Scott with his family claimed to be free, on the ground that they had been taken to free territory and could not be held in slavery after returning to Missouri. In the decision it was stated that Scott had no right to sue for liberty, because no colored person was regarded by the Constitution as a citizen and that colored persons had no rights which a white man was bound to respect. The decision attracted much attention, because it degraded the slave to the level of a machine and showed no respect for human sentiment.

DREIBUND (drī'bo͝ont), the compact formed between Germany, Austria, and Italy for mutual defense and friendship. Germany and Austria formed the Dual Alliance in 1879, and, by admitting Italy to the compact in 1882, the Dual Alliance was formed into a Dreibund. This compact long remained a balance of power in the continent of Europe and provided an important safeguard in the maintenance of peace, but Italy withdrew from it in 1915.

DRESDEN (drĕz'dĕn), a city of Germany, capital of the kingdom of Saxony, situated in the valley of the Elbe River. A number of boulevards lead up to and surround the city, while extensive orchards and vineyards abound in the vicinity. Portions of the city are on both sides of the Elbe, the newer part being especially beautiful by reason of broad streets and fine pavements. The population is largely Lutheran in religion and supports numerous fine churches, many of which have important connection with historical and international events. Many of the government buildings are beautiful in the interior, though rather plain externally. The royal library contains 450,000 volumes, including many rare and valuable specimens of ancient writings and numerous manuscripts. The museum attached to the library is famous for its ancient treasures as well as productions of recent artists and sculptors. Among the municipal buildings are several for local government and for public instruction. Besides the public school system, there are the Polytechnic

School, the Conservatory and School of Music, the Academy of Fine Arts, and other noted educational institutions. Dresden is particularly famous for its gallery of pictures, which is counted among the most valuable in the world. It contains 30,000 pictures and 375,000 drawings and engravings.

The recent rapid growth of Dresden is due to its large commerce and industrial establishments. Among the chief manufactures are pianos, porcelain, jewelry, books and stationery, glass, chinaware, clothing, fabrics, and machinery. Local and general commerce is facilitated by extensive electric lines and numerous railroad connections, as well as by navigation on the river. It maintains systems of waterworks, sewerage, electric and gas lighting, and public baths. The streets are kept in a clean condition and in many places are adorned by monuments and fountains. Among the public parks and gardens are the Zoölogical Garden and the Grosser-Garten.

Dresden is mentioned in history in 1206, and has long been a city of importance, both from a commercial and educational standpoint. The sovereigns made it their residence since 1485. It was almost entirely destroyed by fire in 1491, but subsequently it was extended and improved by Augustus the Strong. The enlargements and valuable improvements made by Augustus I. and II. in the first half of the 18th century gave the city a basis for rapid growth during the last century and the impetus it has at present. During the Seven Years' War, the Napoleonic wars, and the revolution of 1849 it suffered severe losses by fire and military destruction, which have since been entirely overcome. Population, 1910, 546,882.

DRESDEN, Battle of, a battle at Dresden, Germany, on Aug. 27, 1813. The French army of 30,000 men occupied Dresden and the allied army of Austrians, Prussians, and Russians, commanded by Schwarzenberg, appeared before it on Aug. 23. Napoleon came with the main army to relieve it on the 26th and a great pitched battle was fought the following day, in which the allies were defeated. The French lost about 7,500 men in killed and wounded, but the allies lost the same number and 20,000 of their men were taken prisoners.

DRESS, the costume or clothing worn by a person as a protection against heat or cold, and at the same time to furnish the conventional covering of the body in the mode or style peculiar to a people. Ideas concerning modesty in dress have differed widely among the people of different ages, but a great majority of the civilized nations have worn garments that cover all parts of the body, except the head and hands. It is quite necessary that wearing apparel should not be uniform in all countries, since the seasons and general climatic conditions vary greatly, making it imperative that the clothing should differ materially according to the requirements of the climatic and other conditions which prevail.

The history of dress is quite as old as that



STYLES OF DRESS.

1, Assyrian. 2, Greek. 3, Roman. 4, German, 14th Century. 5, Spanish, 16th Century. 6, English, 16th Century.

of nations, but the earliest information is based upon traditions and rude sculptures. A good idea of some kinds of costumes is obtained from the mummies of Egypt and we have reasonably authentic accounts of the garments worn by the Babylonians, Assyrians, and Egyptians. Mention of raiment for the body is made in many places of the Old Testament, such as the vestments worn by the early priests, but the first account we have is of the rude covering of the body made with leaves by Adam and Eve. In Exodus xxviii., 42, this injunction is given: "And thou shalt make them linen breeches to cover their nakedness; from the loins even unto the thighs they shall reach." This passage and many others refer to sacerdotal vestments. Frequent mention is made of the raiment of needlework, of purple and fine linen, and of the sackcloth of sorrow and repentance. The mantles worn by the Hebrews were four-cornered and were bordered with fringes and ribbons of blue. The Assyrians were advanced in the arts of dyeing, embroider-

ing, and weaving, and their attire was both convenient and beautiful. They wore sandals after the style of the Egyptians, and their fabrics were made quite largely of flax and cotton.

The Greeks sought to maintain grace and beauty in the fashion of their clothing and wore garments that gave perfect freedom of action to the body. The *chiton,* a close-fitting but long garment, was worn both by men and women and corresponded to the modern shirt. Over this the men wore the *himation,* which was open on one side, and the women used a girdle below the bust, using a *peplos,* a sort of woolen shawl, as an outside garment. A kind of breast support was worn by both Greek and Roman women, but this differed from the modern corset in consisting of a single band of cloth, and it did not have the objectionable tendency of compressing the body. Though the character of dress in Greece and Rome was simple, the garments were well adapted to the climate and conditions of life, and the wealthy dignified them by fine embroidery and ornamentations. The *tunic,* a kind of chiton, was used extensively in Rome, over which an outer garment, the *toga,* was worn. Considerable attention was given to covering of the feet by *sandals* or shoes, and a legging in the form of the high military buskin furnished protection against extreme cold.

The barbarians of Northern Europe wore loose garments made principally of wool, and their chiefs had shirts with sleeves and striped *pantaloons.* Their dress was greatly influenced by the Roman invasion, but from them the Romans came to value the *trousers* as of practical utility. However, they are not the originators of this garment, but this distinction belonged to the Aryan people of Asia, who came across the mountains into the valley of the Euphrates, and from them it came to be introduced among the people of Europe. While the Chinese and Japanese have steadily held to the dress worn from a remote period in history, the people of Europe, on the other hand, acquired a love of change in the form of dress. Careful cutting and fitting displaced the simple and loose garments of the early centuries of the Christian era, and the clothing came to be firmly sewed and closely fitted about the hips, bust, and waist. The loose garments gave way to the coat, vest, and pantaloons worn by men, who laced or buttoned their garments tightly and dressed the feet and legs by using tight-fitting stockings and shoes.

Exaggeration in the head gear came into vogue about the 13th century, when women began to wear the *hennin,* a very large covering of the head. Later the *miter* and the *horned headdress* coverings for the head became celebrated, against which sermons were preached from the pulpit until they went out of use about the 16th century, but were followed by the grotesque and peculiar footwear in the time of Henry VII. The modern *corset* came into use about the time of Catherine de Medici, and starch was employed largely in preparing the absurd dresses and enormous ruffs of the time of Queen Elizabeth. In 1583 Stubbs wrote: "There is a certain liquid matter which they call starch wherein the devil hath learned them to wash and dye their ruffs, which being dry will then stand stiff and inflexible about their necks." The *farthingale,* a contrivance which extended the skirts out at the hips, came into use among women about this time, when all of the clothing tended toward excess in shape and ornamentation.

The French Revolution was followed by a tendency to simplify all articles of apparel, and may be said to be the beginning of the modern era of fashions. At present the older European costumes are worn only in isolated or remote sections, while the styles of European people are more or less similar and are changed quite uniformly. This is made possible through the publication of periodicals devoted to fashions, in which the newer styles are shown in elaborate plates and discussed quite clearly in directions for selecting the materials and making the garments. The style of dress changes more readily among Europeans than among any other class of people, and may be said to be transitory as compared with the styles of the peoples of Asia and those not materially advanced in civilized art. Indeed, a well-concerted movement for dress reform was inaugurated in 1873, under the auspices of the Crown Princess of Saxony, Germany, who pointed out the evils of unhygienic clothing worn by women. The following year an organization was formed at Boston, the National Dress Association, which declared against shoes with high heels and pointed toes, against wearing heavy veils, against the use of tightly laced corsets, and against garments that lodge a heavy weight on the hips. Though all the measures advocated by associations of this kind have not been looked upon with favor, it may be observed that there is a tendency toward more rational styles of dress for women.

DREW, Daniel, capitalist, born in Carmel, N. Y., July 29, 1797; died Sept. 19, 1879. His early employment was that of a cattle drover, but he later engaged in steamboat building, railroad enterprises, and speculations on Wall Street, New York City. By successful management he amassed a fortune estimated at $12,000,000, but subsequent losses caused him to go into bankruptcy. During his time of prosperity he showed a philanthropic spirit in donating to various educational and benevolent institutions, among them the Drew Theological Seminary, New Jersey; the Wesleyan University, Connecticut; and the Drew Ladies' Seminary, Carmel, N. Y. His donation to the Theological Seminary amounted to about $1,000,000. It is located at Madison, N. J., and is one of the













(Opp. 830)

Judge of the Supreme Court of the United States.

Most Ancient Order of the Thistle.

ROBES OF OFFICE.

Chief Justice of England.

Lord High Chancellor of England in robes of State.

Most Noble Order of the Garter.

Master of Arts at Cambridge University.

highly successful institutions under the direction of the Methodist Episcopal Church.

DREW, John, actor, son of John Drew and Louisa Drew, born in Philadelphia, Pa., Nov. 13, 1853. He received his training under his parents, both noted as actors, and made his first appearance at the Arch Street Theater, Philadelphia, in 1872. Three years later he began to act with much success at the Fifth Avenue Theater, New York City, where he played successful rôles under Fanny Davenport, Edwin Booth, and other celebrated actors. From 1880 until 1892 he played almost continuously with the Augustin Daly Company and in the meantime visited Europe. He began to star on his own account in 1892 and appeared in "The Butterflies," "The Liars," "A Marriage of Convenience," "The Masked Ball," "The Duke of Killiecrankie," and "Richard Carvel." He took part in the classic comedies as *Charles Surface* in "The School for Scandal" and as *Petruchio* in "The Taming of the Shrew."

DREXEL, Anthony Joseph, banker and philanthropist, born in Philadelphia, Pa., in 1826; died in Carlsbad, Bohemia, June 30, 1893. He was identified with the firm of Drexel & Co., Philadelphia, at the early age of thirteen years. At the death of his father he succeeded to the management and extended the business by establishing branch offices in New York, London, and Paris. In 1876 he united with the Rothschilds and others to form a syndicate, which placed on the market bonds of the United States amounting to $300,000,000 at four and one-half per cent. He was connected with the greatest financiers of the world, negotiating loans and stocks for various railroads, canals, and improvement companies. His estate at the time of his death was estimated at about $30,000,000. Among the institutions that he endowed largely are Drexel Institute, Philadelphia; Childs-Drexel Home for Aged Printers, at Colorado Springs, Colo.; Drexel Institute of Art, Science, and Industry; and the German Hospital in Philadelphia. The total donations made to institutions of this character amounted to more than $2,000,000.

DREXEL INSTITUTE OF ART, SCIENCE, AND INDUSTRY, a coeducational institution founded by Anthony J. Drexel at Philadelphia, Pa., in 1891. This institute was established to train and instruct young men and women in the industrial arts and sciences. The courses include those of mechanic arts, applied and fine arts, commerce and finance, electrical engineering, domestic science, mechanical drawing and machine construction, physics, English, chemistry, and mathematics. Evening classes are maintained in the departments in addition to the regular academic instruction, and educational work is promoted through free public lectures. This institution has a library of 40,000 volumes, an endowment of $2,000,000, and buildings and equipment worth $4,000,000. The students in the day classes number 1,250 and in the evening courses, 2,000.

DREYFUS (drā-füs'), **Alfred,** French military officer, born in Alsace, Germany, Oct. 9, 1859. He was educated for a military career, became captain in a regiment of artillery, and in 1894 was accused of having committed treason at the time he held an office in the second bureau of the general staff. The charge brought against him was an accusation of having sold some secrets to certain military officers of Germany. He insisted upon his innocence, but was publicly degraded and in 1895 was imprisoned on the Ile du Diable, an island near the coast of French Guiana. Soon after a movement was begun to collect facts which would prove his innocence, but no material progress was made until Emile Zola wrote a famous letter, in which he charged the general staff of the army with conducting a partial trial and suppressing proofs of the innocence of Dreyfus. This affair caused much excitement in France for more than five years. The case was reopened for trial in 1899 and his punishment was fixed at imprisonment for ten years, but he was soon after pardoned. It became evident that the case rested upon a forgery made by Major Esterhazy, who was envious of the accused. In 1903 the case was again reopened and after three years he was adjudged innocent and was restored to his position in the army. He retired with the rank of major in 1907.

DREYSE (drī'zę), **Johann Nicholas,** inventor of the needle gun, born in Sömmerda, Germany, Nov. 20, 1787; died Dec. 9, 1867. He learned the occupation of a locksmith in the shop of his father, and in 1806 followed his calling at Altenburg and later at Dresden. In 1809-14 he was employed at a gun factory in Paris, working under Pauli, a Swiss officer patronized by Napoleon I. After the fall of Napoleon, he returned to Prussia and established a factory for making machinery and utensils. In 1827 he invented the needle gun without breech-loading and completed the breech-loading needle gun in 1836. The gunnery established by him in 1841 ultimately employed about 1,500 workmen and supplied weapons for the armies of all the German states The rank of nobility was conferred upon him and his family in 1864.

DRIFT, a loose accumulation of transported matter, constituting a peculiar geological formation found in the northern part of Europe and Asia and the eastern and central portions of North America. The drift matters consist of various forms of earth, which in many places are from fifty to a hundred feet in thickness. The surface of drifts is usually smooth with parallel ridges extending for some distances, and at places one set crossing another deposited at an earlier age. Extensive beds of gravel, pebbles, and sand that characterize the drifts are thought to have originated from adjacent

rocks, while large stones show from their composition that they were carried long distances. Many of the larger rocks and bowlders weigh from a hundred pounds to several tons. Those found in the northern drift of Europe extend to about 50° north latitude and in North America to about 40°. A similar drift is found in the Southern Hemisphere, which disappears between 40° and 50° south latitude. These drifts are more marked as one approaches the poles and gradually diminish in thickness toward the Equator. Near the Equator several similar drifts are found, though these are deposited usually around some great mountain, and traces of their movements are evidenced by scratches and erosion on the bowlders of the mountain region.

The cause of drifts is attributed to the action of ice moving southward largely in the form of glaciers. The theory includes the view that in ages far remote the polar regions possessed a warm climate, which later gave way to cold, thus causing the formation of great fields of ice in the high latitudes. Fed by the polar snows, immense glaciers moved toward the Equator and melted as they reached the warmth of the lower latitudes. In this movement the great sheets of ice smoothed the surface of the rock and made scratches and erosions until they melted in the sun of warmer regions. Many of the bowlders and gravel found in all portions of the drift region bear evidence that they were moved long distances and dropped from the glacier carrying them as the warmer regions were reached.

DRILL, a metallic tool for boring holes in hard substances, such as stone, metal, wood, or ivory. The form and size depend upon the material in which the work is done. In stone drilling the tool has either a rotary movement or is lifted and dropped alternately. The drills for rock boring are made largely with black diamond, which constitutes the cutting edges. In metal and wood the action is rotary and the tool is made with two cutting edges, against which the work is pressed as the drill revolves.

DRILLING, a method of sowing seeds in parallel rows instead of planting them in hills or sowing them broadcast. Among the crops commonly drilled are peas, beans, carrots, onions, and other vegetables. These are cultivated more easily and the ground is kept in better condition when drilled so machine cultivation can be introduced. Seeds generally sown broadcast, such as wheat, barley, and flax, are sometimes drilled in rows close together, especially in poor soil, where bone dust or other fertilizing is needed. Corn is sometimes drilled, but is generally planted in hills, as cross cultivation is possible when parallel rows extend in two directions at right angles.

DROMEDARY (drŭm'ê-dâ-rỹ), the Arabian camel, so called from its ability to travel with much speed. It differs from the Bactrian camel in that it has a single hump on its back. The name is applied commonly only to one-humped camels that are noted for their swiftness in travel. See **Camel.**

DROWNING (droun'ĭng), the form of death that results from suffocation in water or other liquids. It was employed as a mode of capital punishment in many European countries, but long since went out of use as a form of punishment in practically all parts of the world. This method of execution was abolished in Switzerland in 1652, Scotland in 1685, Austria in 1776, and Iceland in 1777.

The deaths which result from drowning at the present time are due largely to accidents, and by careful treatment life may be restored within a limited time after breathing has ceased. Recovery is possible only so long as the heart beats, after that it becomes impossible. That death resulted from drowning is evidenced by finding water in the lungs, and usually by small objects held in clenched fingers at which the drowning person grasped while struggling to escape danger. In one or two minutes after submersion complete insensibility ensues and death occurs in from two to five minutes. There are several methods of restoring persons apparently dead from drowning. One of the most common methods is to pull the body, face downward, over a roll of clothing placed under the stomach, by which the water may be expelled from the chest. The head should be supported during this movement, and the body turned on the back occasionally, though when occupying this position the shoulders should be supported.

To restore breathing in persons apparently drowned it is best to kneel over the body and place both hands on the lower part of the chest, immediately below the lowest ribs. By pressing forward the ribs may be raised, thus permitting air to enter the chest as the capacity is enlarged. As soon as the ribs are raised to the greatest possible extent, they are allowed to recoil to their usual position, by which means the air is expelled. By repeating this process at least twenty times per minute a tendency to restore breathing will soon develop. At the same time other persons should be rubbing the body and limbs upward with warmed flannel or their hands for the purpose of stimulating the flow of blood. Small quantities of hot brandy and water, hot coffee, or some other stimulant may be administered as soon as the patient has been restored to a condition in which he is able to swallow. To restore and maintain warmth after a case of apparent drowning is essential. This can be done best by means of rubbing, covering the body with warm clothing, and placing the patient in a suitable bed.

DRUIDS (drụ'ĭdz), the priests of the early Celts of Gaul and Britain. Little is known of this class of people, though Julius Cæsar gave

some details of interest in regard to their worship and manner of living. He described them as a class that possessed chief authority among the Celtic people; that they had some knowledge of mathematics, philosophy, and astronomy; and that their religion was similar to the forms practiced by the Brahmans of India, the Chaldeans of Syria, and the Magi of Persia. They acted as judges, possessed complete control over the people, and were the teachers of the young. Their worship was in groves, and human sacrifice was not uncommon. The mistletoe and oak were sacred in their worship. A chief druid was elected by the people, who held his office for life. Ruins of their stone temples are still found in France and Great Britain. They were suppressed or exterminated at the time of the Roman invasion.

DRUM, a musical instrument of great antiquity. Several forms are in use. The common drum is made by stretching parchment over the heads of a wooden cylinder or a metallic vessel, which may be slackened or tightened at will by means of cords attached to screws or sliding knots. The drum mostly used is the *long* or *bass drum* with two heads, on both ends of which playing is done with stuffed-knob drumsticks. Another kind is the *side drum,* having two heads, the upper being the only one played by means of two sticks of wood; the lower head is formed with strings of catgut stripped across its surface. This kind is commonly called a *snare drum.* Another kind is the *kettledrum,* which is usually employed in pairs. It is formed of hollow brass or copper basins, on which a parchment is fastened by means of an iron ring. These instruments are used mostly in orchestras and military bands, where they are called *tympani.* The ancient Egyptians employed them in martial music and, like the Indians, beat their long drums with the hands. Bacchus is said to be the inventor of the drum. It is reputed that he gave the signal of battle by means of that instrument and the cymbal. The sculptures of Egypt and other ancient countries contain numerous inscriptions of drums, illustrating their use in military parades and in the conflict of battle.

DRUMMOND (drŭm'mŭnd), **Henry,** clergyman and scientist, born in Stirling, Scotland, in 1851; died March 11, 1897. He was educated at the University of Edinburgh and Tübingen University, Germany, and was ordained as minister of the Free Church. In 1884 he was chosen professor of science in the Glasgow Free Church College, in which and in the lecture field he attained much success. He traveled in America and Africa for geological research and scientific inquiry into the life and habits of various unknown species of insects and animals. His writings on scientific subjects and lectures relative to foreign travel attracted much attention. His religious work carried on in the colleges of Scotland and England ranked high in the light of reform, effecting by his advanced and forcible teaching a wholesome change in the atmosphere of college and university life. Among his writings are "Tropical Africa,' "Natural Law in the Spiritual World," "The Greatest Thing in the World—Love," and "The Ascent of Man."

DRUMMOND, Thomas, engineer, born in Edinburgh, Scotland, in 1797; died April 15, 1840. He studied at the high school of Edinburgh and later at the Royal Military Academy, Woolwich, and was noted as a student in mathematics. In 1815 he entered the Royal Engineers, and subsequently assisted Colonel Colby in the trigonometrical survey of the United Kingdom. He is the inventor of the lime-ball light, known as the *Drummond light.* In 1835 he became Undersecretary for Ireland.

DRUMMOND, William, poet, born at Hawthornden, near Edinburgh, Scotland, Dec. 13, 1585; died Dec. 4, 1649. He studied at the high school and the university of his native city, graduating in 1605, and spent several years in traveling on the continent. After 1609 he resided at Hawthornden and gave his attention to literary pursuits. Ben Jonson visited him in 1618 and an account of the visit is preserved in Drummond's "Notes of Ben Jonson's Conversation with William Drummond." He was attached to the High Church principles of the Jacobites, and was the first Scottish writer to displace the native dialect by using the language of the Elizabethan writers. He wrote a history of Scotland and published "Poems," "A Cypress Grove," and "Tears on the Death of Meliades."

DRUMMOND, William Henry, physician and surgeon, born in Leitrim County, Ireland, April 13, 1854; died April 6, 1907. He came to Canada at an early age and attended McGill University, where he graduated in medicine, and in 1884 began the practice at Montreal. He lectured before many literary societies and mixed audiences in Canada and the United States, and is the author of poetic works and many verses in the French-English dialect. His books include "Johnnie Courteau," "The Habitant, and Other French-Canadian Poems," "The Voyageur," and "Phil-o-rum's Canoe."



WILLIAM H. DRUMMOND.

DRUMMOND ISLAND, an island in Lake Huron, one of the Manitoulin group, forming a part of Chippewa County, Michigan. It is about ten miles wide and twenty miles long.

DRUMMOND LIGHT, an intense light invented by Thomas Drummond, of the British navy, in 1826. It is produced by turning two ignited streams of gas, one of hydrogen and the other of oxygen, upon a ball of lime. This light was first used in the coast survey service by placing it in a peculiarly shaped mirror, which served to reflect the rays in converging lines so the entire light was focused toward a central point. The light can be thrown in a straight line a distance of about one hundred miles.

DRUSES (drụ'zẹz), a peculiar political and religious people inhabiting the mountains of Lebanon and Anti-Lebanon. They are of mixed Syrian and Arabian origin and combine certain tenets of the Mohammedan with several of the Christian religion, and constitute a secret religious society. Their origin is found in El-Hakim Biamr-Allah, the sixth Fatimite caliph of Egypt, a fanatical ruler who lived in the 11th century. According to tradition he disappeared from his subjects while walking in the vicinity of Cairo, and his followers were led to believe in his future return to earth to reign over them, though the natural explanation is that he was probably assassinated. A Russian named Ismail ed Derazi proclaimed the tenets of the Druses with such zeal in Lebanon that the converts were named after him and not after El-Hakim. They number between 75,000 and 100,000, are engaged largely in producing and manufacturing silk, and are noted for their sturdy resistance to Turkish dominion.

The Druses believe in the unity of God, who, they think, was manifested in the person of several individuals, but last of all in El-Hakim. Their day of worship is Thursday and their doctrines hold strictly to the transmigration of souls. In 1860, 12,000 Druses were cruelly massacred by the Maronites, when neither male nor female children were spared. The uprising was about to terminate in a general conflict between Christians and Mohammedans, but was suppressed by the arrival of French and Turkish troops. At present they are guaranteed certain religious and political liberties by Turkey, to which country they pay an annual tax. The three classes into which their adherents are divided include princes, chiefs, and the people. The greatest amount of knowledge obtained of these people was published by a Frenchman named De Sacy in 1838, entitled "An Exposition of the Religion of the Druses."

DRYADES (drī'ădz), the tree goddesses or nymphs mentioned in the mythology of Greece. Each dryad partook of the characteristics of a particular tree to whose life it was wedded, and ceased to exist when it was felled or so injured that it withered and died.

DRYDEN (drī'dẹn), **John,** famous poet, born in Northamptonshire, England, Aug. 9, 1631; died May 1, 1700. He was the son of a distinguished family, was educated at Westminster School, and became distinguished on account of close application to study and educational research. Later he went to Cambridge, where he was elected to a scholarship, and afterward proceeded to London to fill an appointment as secretary to his cousin, Sir Gilbert Pickering, a devoted friend of Cromwell. After the death of the protector, he wrote his "Heroic Stanzas on the Death of Cromwell," thereby attracting much attention. "Astraea Redux" is a poem written shortly after the restoration of Charles II. as King of England, in which the restoration is hailed with joy. His writings for the stage were the poorest of his works and were criticised adversely on account of an immoral tone and tendency. In 1661 "The Duke of Guises" appeared, and shortly after he published "The Wild Gallant." He was appointed poet laureate in 1670 with a salary of $1,000 a year.



JOHN DRYDEN.

While poet laureate and at the height of his prosperity, Dryden made a contract with several theaters which provided that he was to supply three plays each year, for which he was to receive about $1,500, but the contract was never complied with. In 1681 he published "Absalom and Achitophel," in which he made a sarcastic attack on prominent men, and it was regarded the most personal political satire in England. His "Hind and Panther" was issued in 1687, and, being devoted to a religious discussion, it led to much adverse criticism and abuse, Macaulay calling him "an illustrious renegade." The controversy was due largely to the fact that he had gone over to the Roman Catholic faith, for which he has been both severely criticised and as warmly defended. He was deprived of his laureateship at the Revolution, which brought him to straitened circumstances and induced him to again write for the stage. His fables and satires are masterpieces, though his plays are exaggerated in expression and largely devoid of character. Among other productions worthy of note are "Essay on Dramatic Poesy," "Ode on Alexander's Feast," "Mac Flecknoe," "The Medal," "All for Love," and "The Rehearsal."

DRYING OIL, an oil used in painting and which has the property of drying quickly. The name is applied in a general sense to linseed oil and other seed oils, but particularly to oils of this class prepared with the special view of hastening the drying, which is done by heating with oxide of lead. They absorb oxygen when exposed to the air, hence become a dry, tough

mass. Drying oil is used to paint the woodwork and other parts of buildings.

DRY TORTUGAS (drī tôr-tōō'gȧs), a group of ten small islands of coral formation situated southeast of Cape Sable, Florida. They are low and barren and most of the surface is covered with low brushwood. Two lighthouses are maintained by the government, one of which is 150 feet high. Fort Jefferson is an important fortification on Garden Key, and was used as a penal station for Confederate prisoners in the Civil War. Prisoners under sentence for court-martial are still occasionally confined in the fort. For local government the island belongs to Monroe County, Florida.

DUANE (dû-ān'), **James Chatham,** military engineer, born in Schenectady, N. Y., June 30, 1824; died Nov. 8, 1897. He graduated from West Point in 1848, where he became an instructor. Subsequently he was superintendent of fortifications and lighthouses for New York, and later became engineer to the Utah expedition, serving till 1861. In the Civil War he rendered efficient aid in the army of the Potomac and the department of the South. For valuable service in most of the battles of the Wilderness and elsewhere he was advanced to and rank of lieutenant colonel. Later he was promoted brigadier general and retired from the service in 1888. Following his retirement, he was engaged as commissioner on the New York Croton aqueduct.

DU BARRY (dü bȧ-rē'), **Marie Jeanne Bécu,** the celebrated mistress of Louis XV., born at Vaucouleurs, France, Aug. 19, 1743; died Dec. 7, 1793. She was the daughter of a woman named Anne Bécu and was brought to Paris at an early age, where she afterward won many friends among the rich and philanthropic. Louis XV. was captivated by her charms in 1769 and made her his mistress, but she was ostensibly the wife of Comte Du Barry.

DUBLIN, county seat of Laurens County, Georgia, on the Central of Georgia and other railroads. It has brick yards, machine shops, cotton mills, and well improved streets. The chief buildings include the courthouse, city hall, high school, public library, and federal building. It was settled in 1807. Population, 1910, 5,795.

DUBLIN (dŭb'lĭn), the metropolis and capital of Ireland, in Dublin County, on the Liffey River, at the entrance to Dublin Bay. The city is divided into two parts by the river which is crossed by numerous stone and iron bridges. Extensive docks and wharves are located at the mouth of the river. It has many beautiful streets and thoroughfares, the most noted being Sackville Street, which passes through the city at right angles to the river, and is 660 yards long and forty yards wide. The principal public buildings include the castle, the official residence of the chief officer of Ireland; Trinity College; the bank of Ireland; the customhouse; the court of justice; the post office; the commercial buildings; the city hall; and other large structures. Among the most important educational institutions are the Dublin University, Royal College of Science, College of Surgeons, Roman Catholic University, Royal University, Royal Irish Academy for Promoting the Study of Science, Literature, and Antiquities, Royal Hibernian Academy of Painting, Sculpture, and Architecture, and the Royal Zoölogical Society. Phoenix Park is a fine public resort northwest of the city, with an area of 1,760 acres.

The railroad facilities of Dublin are extensive. It has excellent harbor improvements and a considerable commerce. Electric car lines furnish convenient connection with all parts of the city and many suburban districts. All the principal streets are finely paved, beautified by trees and statuary, and lighted by gas and electricity. The chief manufactures are textiles, earthenware, machinery, and sailing vessels. Trinity College, founded by Queen Elizabeth, has a library of 200,000 volumes. Besides this library, there are reading rooms and libraries under the control of the city and educational institutions, and as a whole comprise collections of books, manuscripts, and antiquities of much value in educational arts. The city was captured by the Danes in the 9th century and taken by the English under Henry II. Large portions of the city were destroyed by fire in 1190 and visited by several great conflagrations since. The royal party of England captured the city during the protectorate of Richard Cromwell. James II. held a parliament here in 1681. In 1800 the flag of the United Kingdom was raised over the city, when Ireland became united with England. Population, 1907, 291,842; in 1911, 309,272.

DUBLIN, University of, an institution of higher learning at Dublin, Ireland, established by Queen Elizabeth in 1591. The first University of Dublin was established in 1320, but perished from a lack of an endowment and the dissolution of Saint Patrick's Cathedral by Henry VIII. The official title is College of the Holy and Undivided Trinity, so named in the charter of incorporation. James I. granted it representation in Parliament, and it now is represented by two members in the House of Commons. The senate has power to elect the chancellor and grants degrees. This body consists of "the chancellor of the university, or, in his absence, of the vice chancellor, or such doctors and masters of the university as shall have and keep their names on the books of Trinity College." At present the faculty consists of a prevost, seven fellows, twenty-six junior fellows, and seventy foundation scholars. The fellows are of two grades, senior and junior, the former comprising the chief officers and the latter the larger part of the tutoral force of the college. Instruction is divided into a course covering four years.

Students are admitted by examination. The library contains 260,000 volumes. At Dunsink, five miles from the college, is located the astronomical observatory. The total attendance is about 1,350 students.

DUBOIS (dụ-bois'), a borough of Clearfield County, Pennsylvania, on Sandy Lick Creek, about 125 miles northeast of Pittsburg. It is on the Pennsylvania and the Buffalo, Rochester and Pittsburg railroads. Among the noteworthy features are the high school and the public library. The principal manufactures are machinery, flour, railroad cars, spirituous beverages, leather, window glass, cotton and woolen goods, and hardware. Large quantities of coal and gas are produced in the surrounding country. It was settled in 1873 and incorporated in 1887. Population, 1900, 9,375; in 1910, 12,623.

DUBOIS (dụ-bois'), **Fred T.**, public man, born in Crawford County, Illinois, May 27, 1851. He attended Yale University, graduated in 1872, and in 1880 removed to Idaho and took up a business career. In 1882 he was made United States marshal, serving four years, and was active in the anti-Mormon agitation. He was a territorial delegate to Congress in 1887-91, promoted the admission of Utah as a State, and was the first United States Senator, serving from 1891 until 1897. In 1896 he withdrew from the Republican national convention and supported Bryan as a candidate for President, and in 1901 was elected as a Democrat to the United States Senate.

DUBOIS (dü-bwä'), **Théodore**, organist and composer, born in Rosnay, France, Aug. 24, 1837. He was instructed by local teachers and attended the Paris Conservatory of Music, where he graduated in 1861 and won the Grand Prix de Rome. In 1877 he was made organist in the Church of the Madeleine in Paris, and succeeded Gounod as chairman of the French Academy in 1894. Besides being an officer of the Legion of Honor, he was listed with a number of important foreign societies. He published many orchestral works, numerous cantatas, and several masses that are used widely. A grand opera entitled "Aben Hamet" is an important production, and his "Notre Dame de la Mer" is a popular oratorio.

DUBUQUE (dụ-būk'), a city of Iowa, county seat of Dubuque County, on the Mississippi River, 200 miles northeast of Des Moines. It is on the Chicago Great Western, the Illinois Central, the Chicago, Milwaukee and Saint Paul, and the Chicago, Burlington and Quincy railroads. Regular communication is maintained by steamboats with ports on the Ohio and the Gulf. It is regularly platted with wide streets. Several bridges cross the river. The manufactures include wagons, farm machinery, lumber, cigars, utensils, soap, flour, clothing, and hardware. An extensive grain market has caused the building of large elevators. The pork packing establishments produce packed and cured meat. It has large interests in lead, being a depot for the lead-producing districts of northeastern Iowa.

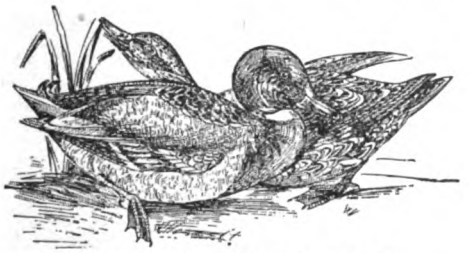
The noteworthy buildings include the courthouse, the post office, the public library, and the city hall. It is the seat of Wartburg Seminary (Lutheran), the German Presbyterian Theological Seminary, an Episcopal seminary, Saint Joseph's College and Academy, Iowa Institute of Science and Art, Saint Mary's Academy, and a number of convents and business colleges. Electric street railways, public waterworks, stone and asphalt pavements, a sewer system, and public lighting are among the improvements. The site of the city is a portion of the region occupied by the first permanent settlement in the State. John King established the *Dubuque Visitor* in 1836, the first periodical published in Iowa. It was incorporated as a town in 1837 and was chartered as a city in 1840. Population, 1910, 38,494.

DUCAT (dŭk'ăt), a coin of different value, chiefly of gold, and formerly used extensively in Europe. Ducats were first made in the 11th century by the emperors of Byzantine, and by the next century were used generally in the southern part of Europe, especially in Sicily and Italy. In 1559 the diet of Germany adopted the ducat, and it soon came into use in all parts of Northern Europe. At present it is not issued, except in Austria-Hungary, where the gold ducats are coined for use in foreign trade. The silver ducat used formerly had a value of seventy-five cents to $1.10 and the gold ducat was valued at about $2.32. Ducats coined in ancient Venice were valued at about $1.46.

DU CHAILLU (dü shà-yü'), **Paul Belloni**, traveler and author, born in Paris, France, July 31, 1835; died April 29, 1903. He was the son of a trader on the west coast of Africa, and at an early age acquired proficiency in the use of the languages spoken by several native tribes. He brought a cargo of ebony wood to the United States in 1852, and soon after published a work relating to the Gaboon country. Returning to Africa in 1855, he spent four years exploring the unknown regions near the Equator, and in the meantime shot and stuffed various birds and animals. In 1859 he brought a large collection of specimens and African weapons to New York City, where they were sold at good prices. While on an African voyage in 1863-65 he discovered the pigmies, a race of peculiar beings since met with and described by various explorers. After returning to America, he devoted his attention to lecturing and the publication of books relating to his travels. Among his publications are "Explorations and Adventures in Equatorial Africa," "A Visit to Ashango," "Lost in the Jungle," "Stories of the Gorilla Country," and "Country of the Dwarfs." Later he made a visit to **Finland**,

Lapland and Norway, and published "The Land of the Midnight Sun."

DUCK, the common name of a large family of widely distributed web-footed birds. They include many species and are met more or less in all portions of the inhabited world. Many ducks are migratory, going to higher latitudes to breed in the summer season. They deposit from six to twelve eggs in a nest built among the reeds near the edge of bodies of fresh water, or in the hollows of trees or crevices of rocks. Ducks are peculiarly awkward in walking, having a waddling movement, but their flight is brisk and their ability to swim is quite highly developed. The wild species are classed as sea ducks and true ducks. Ducks of the former class are migratory, being seen frequently in large flocks moving to and from the higher latitudes. The most common wild duck of Central North America in the primeval period was the *mallard,* a fine game bird, and it is still found in many regions. The female is of a grayish color, while the male has an attractive plumage. In the latter the head is bluish-green, the neck is chestnut colored with a fine ring of



MALLARD DUCK—MALE AND FEMALE.

white, and the body is finely marked in various light, blue, and greenish shades. In the duck family the bill is large, though it is greatly diversified as to size and shape. Some are flat and rounded at the top, others are quite sharp, while the *scaup duck* has a spoon-shaped bill. The *pintail* is characterized by a pointed tail. The flesh of ducks is a wholesome and favorite food and is much sought at all times, except in the season of breeding. Domestic ducks have been developed from the wild species, probably largely from the *wood duck* and the *mallard.* They are grown extensively for the flesh and feathers. The eggs, though excellent food, are not as well liked as hens' eggs. Besides, ducks do not produce eggs abundantly. The *musk duck,* a native of South America, often erroneously called *Muscovy duck,* is almost as large as a goose and is the largest of the duck family. The drake or male of all domestic ducks and of many wild species is distinguished by marked differences in plumage, is somewhat larger than the female, and has four curved tail feathers. Its voice is low and basslike and quite different from the quack of the female.

DUCKBILL, or **Water Mole,** an aquatic egg-laying animal, the only living species of the order *Monotremata.* It is native to Australia and the adjacent islands, including Papua and Tasmania. The body is about twenty inches long, which includes the bill and tail, and is thickly covered with a brown fur. The head is small, the teeth are near the base of each mandible, and the males have spurs on the hind legs. This animal has a horny bill similar to that of a duck, but it breathes through nostrils at the tip of the bill. Though an aquatic animal, it can climb trees with facility, and is able to dig long burrows with its feet. The fore feet are strong and have five toes, and the hind feet are smaller and the five toes are armed with claws. It feeds chiefly on worms and insects and prefers to live in large colonies. Reproduction is by eggs, which are covered with a soft and flexible shell, and only a few are laid at a time. At birth the young are blind and naked, but grow rapidly, subsisting on milk drawn from the milk glands of the mother. The duckbill has a gentle disposition and its voice resembles that of a young dog.

DUCKING STOOL, a kind of stool used for punishing scolds, especially scolding wives. It came into common use in many European countries in the 15th century, and was employed as an apparatus for inflicting punishment in Europe and America until the beginning of the 18th century. Many forms of ducking stools were in use, but the most common kind consisted of a mechanical arrangement whereby the culprit was fastened in the chair and moved up and down in the water, the head alone remaining above the surface, though it was sometimes submerged momentarily. Addison speaks of its use by saying, "Reclaim the obstinate and virulent woman, and make the ducking stool more useful."

DUCKWEED, the name of a small plant that floats upon the water, the rootlets hanging loosely beneath. It consists chiefly of flat green fronds and is found widely distributed on the surface of stagnant waters. The flowers are unisexual, destitute of calyx and corolla, and the fruit is rarely seen, since it propagates chiefly by new fronds budding from those already developed.

DUCTILITY (dŭk-tĭl'ĭ-tў), the quality of some substances by which they may be drawn into wire. Soft metals possessing only slight ductility cannot be drawn into wire, but may be converted into that form by a process of squirting or pressing. The degree of ductility in the important metals is in this order: gold, silver, platinum, iron, copper, zinc, tin, lead, and nickel. These metals are malleable, that is, they may be beaten into leaves or sheets, but in a relatively different order, as follows: gold, silver, copper, tin, platinum, lead, zinc, iron, and nickel.

DUDEVANT (dü-d'-vän'). See **Sand, George.**

DUDLEY (dŭd'lĭ), **Joseph,** jurist and governor, born at Roxbury, Mass., Sept. 23, 1647; died April 2, 1720. He graduated at Harvard in 1665, studied law and theology, and was a magistrate in Roxbury in 1673. Two years later he negotiated a treaty with the Narragansett Indians. He went to England on behalf of the colonists in 1682 and again in 1693, and was appointed to high offices in New York and New England. He was chief justice of New York from 1690 until 1693, and in 1702 became governor of the colony of Massachusetts, serving until 1715.

DUDLEY, Robert. See **Leicester.**

DUDLEY, Thomas, second colonial governor of Massachusetts, the father of Joseph Dudley, born in Northampton, England, in 1576; died July 31, 1653. He served in the army of Queen Elizabeth and in 1630 went to the Massachusetts Bay Colony as deputy governor under Winthrop, serving thirteen years in that office. Four times he was chosen governor of the colony, in the years 1634, 1640, 1645, and 1650. He founded Newtown, now Cambridge, Mass., and aided in establishing Harvard College. He was twice elected president of the New England Confederation, and was a leader of the party that advocated greater liberty for the colonies.

DUEL (dū'ĕl), a word derived from the Latin *duellum,* signifying a premeditated and prearranged mortal combat between two persons for the purpose of deciding some point of difference, or establishing some question of honor. Dueling was practiced in early ages and is referred to by some writers as a trial by battle. In a modern duel at least four persons are required to be present, including the two *combatants* or *principals* and a *second* for each principal. The seconds arrange the time, place, and mode of fighting the duel, though the choice of arms belongs exclusively to the person receiving the challenge. In former times it was thought a mark of honor to resent an insult by issuing a challenge, but modern public opinion has rendered dueling cowardly and disgraceful and has caused it to become almost obsolete. However, the practice is still regarded as honorable in some countries, particularly in the Latin states of Europe and some countries of Asia.

It is thought that the practice of dueling in modern Europe was the outgrowth of the custom of wearing a sword, and was most common in the 16th century. In many countries, particularly in France, challenges were issued on the most trivial and commonplace grievances, and the practice still occurs among students in the German army and some of the universities. In the reign of Henry IV. of France the number of persons falling in duels is estimated at fully 6,000. Sully, minister of Henry IV., opposed the practice with much energy, but the king favored it, because he thought it tended to maintain a spirit of militarism among the people. A decree was issued against it in 1602, but with little effect. More than 4,000 nobles lost their lives during the minority of Louis XIV. From France the practice was carried to England in the reign of James I., where it became quite common. Among the well-known men who fought duels in England are included William Pitt and the Duke of Wellington. The most celebrated duel occurring in America was the mortal combat between Alexander Hamilton and Aaron Burr, in which the former was slain. Great indignation was aroused among the people in the United States on account of the death of Hamilton, and the practice grew less common. It is now looked upon as a foolish and inhuman act to issue a challenge.

DUERO, or **Douro.** See **Douro.**

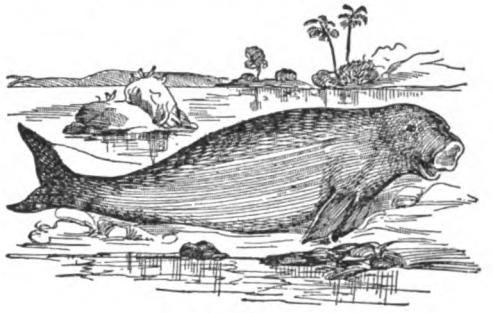
DUFF, Alexander, missionary, born in Perthshire, Scotland, April 26, 1806; died in Edinburgh, Feb. 12, 1878. He was sent to India in 1839 as the first missionary of the Scottish Presbyterian Church. His voyage was endangered by two shipwrecks, but he reached India safely in the spring of 1830, and entered upon effective work in religious instruction among the natives. A school founded by him in Calcutta soon grew to importance, receiving friendly support from several sources, and was attended by many students. He returned to Scotland for a short period on account of ill health, but soon after continued his aggressive work in the missionary field. After the religious disputes of 1843 he joined the Free Church party of the Church of Scotland and discontinued his college work. In 1844 the Calcutta *Review* was founded by his assistance. Five years later he returned to Scotland and subsequently made a successful missionary tour in America. Returning to India, he assisted in founding the University of Calcutta, and in 1863 returned to his home, where he became professor of New College, Edinburgh, in which he taught until his death. His extensive knowledge of the public affairs of India made him an important factor, both in religious work and in general culture. The educational work instituted by him in connection with religious teachings has been the basis of the most important movement in this line in India, and is still bearing important and wholesome results.

DUFFERIN AND AVA (dŭf'fẽr-ĭn ä'vȧ), **Frederick Temple Hamilton Blackwood, Marquis of,** British statesman, born at Florence, Italy, June 21, 1826; died Feb. 12, 1902. He descended from a distinguished family, was educated at Eton and Oxford University, and succeeded to the title of Baron Dufferin in 1841, while still in his minority. In 1850 he was created an English baron and served as

lord-in-waiting to Queen Victoria for several years. Paying a visit to the south of Ireland during the famine of 1846-47, he wrote a work entitled "Irish Emigration and the Tenure of Land in Ireland." He made a voyage to Iceland in 1853 and shortly after published his "Letters from High Altitudes." From 1860 to 1872 he was prominent in the ministry, and in the latter year was appointed Governor General of Canada, in which position he served six years. In 1879 he was chosen ambassador to Saint Petersburg, in 1881 was transferred to the embassy at Constantinople, and in 1884 was appointed Viceroy of India. He became ambassador at Rome in 1888, was created Marquis of Dufferin and Ava, and was transferred to Paris in 1891, from which embassy he retired in 1896, thus terminating his diplomatic career. On account of eminent scholarship he was the recipient of many distinguished honors. His "Speeches and Addresses" was published in London in 1882, and eight years later his "Speeches in India" appeared. Among the British statesmen and diplomats of the last century he takes high rank.

DUFFY (dŭf'fĭ), **Charles Gavan,** author and statesman, born in Monaghan County, Ireland, in 1816; died in 1903. He engaged in journalism at an early age and founded the *Nation* in Dublin, which was made the organ of the younger element in Irish politics. This publication was afterward reorganized under the name of *The Irish Confederation,* and in 1848 he was tried for treason felony and acquitted. He went to Australia in 1856 to engage in the practice of law at Melbourne, and the following year was made minister of public works in Victoria. Subsequently he entered the Parliament of Victoria, and in 1871 was Prime Minister and was knighted. He returned to Europe in 1880 and took up his residence in France. "Ballad Poetry of Ireland" is his most popular work, and has passed through fifty editions. Other writings are "Four Years of Irish History," "Young Ireland," and "Conversations with Carlyle."

DUGONG (dụ-gŏng'), an herb-eating sea mammal of the genus *Halicore.* Cuvier classed it with his order of *Pachydermata,* which includes the rhinosceros and other thick-skinned animals, but the order is not recognized at present. The eyes are small, the upper lip is thick and fleshy, and the upper jaw bends downward almost at a right angle. It has a whitish color below and a slate-brown or bluish-black above. The common length is eight or ten feet, though some are twenty feet long. It is widely distributed in tropical seas, but is most common in the waters of Southern Asia and the East Indies. Its food is marine vegetation, principally algae, which it finds in shallows or at the river estuaries. The natives pursue it for its flesh, which resembles the beef of young cattle and is highly nutritious. The mother has a feeble voice and shows intense affection for her young.



DUGONG.

DU GUESCLIN (dü gâ-klăn'), **Bertrand,** constable of France, born near Dinans, in Brittany, about 1320; died July 13, 1380. He entered the military service in 1342 under Charles of Blois, and was an important factor in expelling the English from many parts of France. In 1356 he defeated the Duke of Lancaster at Rennes, but was taken prisoner by the English under the Black Prince in 1367. He was released on the payment of a large ransom and became constable of France in 1369, and expelled the English from nearly every province in France before 1375.

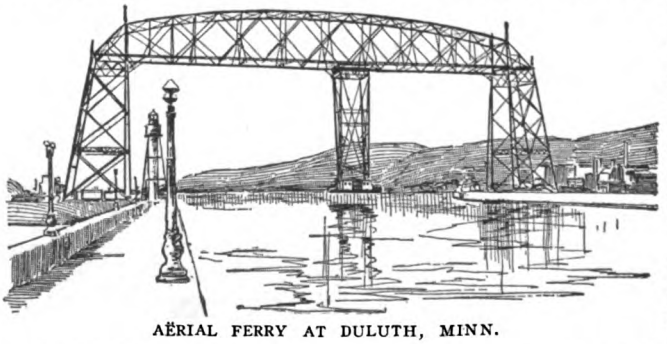
DÜHRING (dü'rĭng), **Eugen Karl,** philosopher, born in Berlin, Germany, Jan. 12, 1833. He was educated at Berlin and practiced law in that city, but was compelled to abandon his profession, owing to an affection of the eye, and eventually he became totally blind. From 1864 to 1877 he lectured on philosophy and political economy at the University of Berlin, from which position he resigned in the latter year and gave his attention exclusively to economical and philosophical subjects. Both in writing and in teaching he was unduly personal and somewhat materialistic, and was opposed to the theory of pessimism and the doctrine of Kant that the categories of time and space have only subjective validity. Some of his writings have been widely translated and have had general circulation. They include "The Worth of Life," "Theory of Logic and Knowledge," "Critical History of the General Principles of Mechanics," "Critical History of Philosophy," "Capital and Labor," and "Theory and Logic of the Sciences."

DUISBURG (dōō'ĭs-bụrk), a city of Germany, in Rhenish Prussia, fifteen miles north of Düsseldorf. It is finely located between the Ruhr and the Rhine, with which it is connected by canals, and is the converging center of several railroads. The noteworthy buildings include the Church of Saint Salvator, the town hall, the public library, and a number of gymnasiums and *Realschulen.* The streets are straight and well improved with modern utilities, such as electric street railways, water-

works, sewerage and stone and asphalt pavements. It has manufactures of steel and brass wares, glue, tobacco, beet sugar, soap, furniture, chemicals, and machinery. In the vicinity are extensive coal mines and stone quarries. It has a large shipping trade in grain, coal, iron ore, and merchandise. Duisburg is an ancient town, but its larger growth is comparatively recent. Charlemagne fortified it and in the 13th century it became a member of the Hanseatic League. Subsequently it was made a free town, but was annexed to Prussia after the Napoleonic War. Population, 1905, 192,346; in 1910, 229,478.

DULCIMER (dŭl'sĭ-mēr), a musical instrument used in almost all countries. It dates from ancient times. In shape and construction it is similar to the dulcimer made many centuries ago, and as a whole the instrument has undergone fewer changes that any other musical device. It consists of a flat box with a sounding board crossed by bridges, to which wires are fastened and tuned by pegs at the sides. The operator performs upon it by striking the wires with small pieces of wood held in each hand, or with two hammers containing heads of cork. It differs from the psaltery in the manner of striking the wires, while a pianoforte is in reality a dulcimer on a large scale.

DULUTH (dụ-lōōth), a city of Minnesota, county seat of Saint Louis County, at the west end of Lake Superior. It is on the Northern Pacific, the Great Northern, the Chicago and Northwestern, the Duluth, South Shore and Atlantic, the Duluth and Iron Range, and other railroads. Being situated at the western extremity of navigation on the Great Lakes, opposite Superior, Wis., it is highly important as a wholesaling and distributing center. The harbor is nine miles long and two miles wide, and is protected by a narrow strip of land called Minnesota Point, which forms a natural breakwater and is cut by ship canals, through which large vessels pass. The largest of these canals, which is located near the city, is crossed by the celebrated aërial ferry. It is the only structure of the kind in America and has the advantage of leaving the canal clear, carrying pedestrians, vehicles, and street cars at regular intervals. The United States government has expended large sums in dredging and otherwise improving the harbor for heavy shipping.



AËRIAL FERRY AT DULUTH, MINN.

The city occupies a fine site overlooking the lake. It stretches along the lake shore a distance of about twenty miles, and Superior Street, the principal thoroughfare, extends nearly parallel to the shore the entire distance. The ground rises rapidly from the margin of the water. The business section is near the lake, occupying a level and slightly elevated tract, while the finer residential sections are in the higher lands toward the west and northwest. It is one of the leading shipping points in the country. Among the industries are sawmills, grain elevators, machine shops, flouring mills, car works and blast furnaces. In the vicinity are quarries of sandstone and granite.

Duluth is generally well built and the public utilities are modern and well managed. The public high school, one of the finest in the Northwest, was erected at a cost of $300,000. Other noteworthy buildings include the Carnegie public library, the Federal building, the Masonic Temple, the Spalding and Saint Louis hotels, the State Normal school, the Board of Trade, the Lyceum theater, and many fine churches. Lincoln, Chester and Grand View are among the public parks. Daniel Gresolon (Sieur du Lhut), after whom it was named, visited the place in 1680, but it was not settled until in 1853. It became a town in 1867, and was chartered as a city in 1870. The growth of the city from 1880 to 1900 is one of the most remarkable in the United States, the population of the former year being 3,843, while in 1900 it was 52,969. Population, 1910, 78,466.

DUMA, or **Douma,** the lower branch of the legislative department of Russia, established by an imperial manifesto on Oct. 19, 1905, and frequently referred to as the National Assembly. It is composed of about 500 members, who are elected by the Zemstvos, and has joint legislative power with the Council of the Empire, but bills passed by both these branches are subject to veto by the emperor, and cannot be introduced the second time without the royal consent. Among the restrictions upon the duma are that it cannot take part in legislation regarding titles of nobility or entailed estates. Neither can it discuss the reports of the Minister of Finance, or consider charges of malfeasance against members of the council or officers of the government.

DUMAS (dü-mä'), **Alexandre Davy,** noted novelist, born in Villers-Cotterets, France, July 24, 1802; died Dec. 5, 1870. He was brought up in a French country town, and at the age of

twenty-one proceeded to Paris to seek his fortune. Almost reduced to poverty, he ultimately secured a clerkship and later began to write plays. His "Henry III." soon became popular in Paris and gained a reputation. Entering upon a tour of Switzerland, he contributed reports of the journey to a magazine, by means of which he became well known, and subsequently his "The Count of Monte Cristo," made his acquaintance world wide. Soon after he published "Three Musketeers," which proved no less popular than "The Count of Monte Cristo," the two arousing interest equal to "Robinson Crusoe" and Scott's "Waverly." Later he undertook story writing, for which purpose he employed assistants and published several works as his own productions. His life was characterized by various extensive schemes, one of which was joining the army under Garibaldi in 1860, through which his fortune was lost and he became penniless. During the time of his prosperity he made more than $50,000 a year by writing, but at the time of his death he had scarcely greater means than when he started on his work in Paris as a young man. Among his general writings are "The Black Tulip," "Twenty Years After," and "Margaret of Anjou."

DUMAS, Alexandre, son of Alexandre Davy Dumas, novelist, born in Paris, France, July 28, 1824; died Nov. 27, 1895. He was educated at the College Bourbon, receiving much assistance for his literary work from his father. His early life was spent largely in company with actors anl literary people, through whom he acquired an interest in literature, and his work of writing poetry and sketches began at an early age. He published his first book in 1840 and produced a popular drama four years later. Publishing several successful comedies, he was installed as a member of the French academy in 1875, and was made grand officer of the Legion of Honor in 1894. Among his best known writings are "La Traviata," "De Fils Naturel," "Francillon," and "Monsieur Alphonse."

DU MAURIER (dü mō-ryā'), **George Louis Parmella Busson,** caricaturist and author, born in Paris, France, March 6, 1834; died in London, Oct. 8, 1896. He was liberally educated, studying chiefly in Paris, and adopted art as a profession. His first employment was that of illustrating sketches for several London periodicals, including *Once a Week* and *The Cornhill Magazine,* and later he became a member of the staff of *Punch,* in which many of his sketches of social life appeared. He published a series of essays on his art in *Punch* in 1890, and prepared illustrations for Thackeray's "Henry Esmond" and Jerrold's "The Story of a Feather." As a writer his fame was made in 1891 by publishing "Peter Ibbetson," and it was greatly extended in 1894 by his publication of "Trilby." The latter appeared as a serial in *Harper's Magazine,* but its height of popularity was not reached in America until it appeared in book form. Soon after it was dramatized and placed with considerable success on the stage in many important cities. In 1896 "The Martian" and numerous contributions to *Punch* were published. His finest productions in art are the illustrations of Thackeray's works, and his most popular writing is "Trilby."

DUMBARTON (dŭm-bär'tŭn), a seaport and the capital of Dumbartonshire, Scotland, thirteen miles northwest of Glasgow. It is situated on the Leven River, near its entrance into the Clyde, and has transportation facilities by steamboats and railways. The castle of Dumbarton, located at the mouth of the Leven, stands on a basaltic rock which rises about 560 feet. This castle is maintained by the government under the treaty of union between England and Scotland, whose terms require that it and three other Scotch castles be kept in repair. Sir William Wallace, the Scotch hero, was for a time imprisoned in the castle. It was a residence of Mary, Queen of Scots, before she went to France. Dumbarton has extensive shipyards, iron foundries, cordage works, and machine shops, and is the center of considerable trade in merchandise and produce. Population, 1917, 20,864.

DUMFRIES (dŭm-frēs'), a river port and the capital of Dumfrieshire, Scotland, 72 miles southwest of Edinburgh. It is situated on the Nith River, nine miles from its entrance into the Solway Firth, and has convenient railroad facilities. The chief buildings include the post office, an infirmary, the Crichton Institution, and a number of fine schools and churches. Among the manufactures are hosiery, baskets, clothing, leather, and boots and shoes. Dumfries is noted for its early history. In 1306 Robert the Bruce slew the Red Comyn in the Greyfriars' Monastery, which was built by Devorgilla, the mother of John Baliol. Robert Burns, the poet, is buried in the Saint Michael's churchyard. The Young Pretender made Dumfries his headquarters in 1745. Population, 1907, 20,150.

DUMOURIEZ (dü-mōō-ryā'), **Charles François,** famous general, born in Cambrai, France, Jan. 25, 1739; died March 14, 1823. He descended from a respectable family, secured a good education, and attached himself to the army, serving with distinction during the Seven Years' War. In 1768 he became quartermaster general of a small army in Corsica, with which the conquest of that island was undertaken, and afterward he was made a colonel for faithful service. He was appointed governor of Cherbourg in 1778, and, when the Revolution broke out, he joined the popular party, becoming minister of foreign affairs in 1792. At the beginning of the war between France and Austria he took a command in the army, succeeded in an invasion of Flanders, and conquered Bel-

gium. His loyalty to the revolutionary government was mistrusted, and soon after he became allied with the party favoring a constitutional monarchy, and he was compelled to flee when attacked by the Versailles volunteers on March 4, 1793. A price was set upon his head by the convention, but he escaped by giving himself up to the Austrian government, and later settled as an exile in England. He published his "Memoirs" in 1794, which he wrote himself, and published an enlarged edition in 1822. Dumouriez remained in exile until the time of his death.

DÜNA (dü'nà), or **Southern Dwina,** an important river of western Russia, rises in the Valdai Hills, flows toward the southwest, and thence makes a bold curve toward the northwest and discharges into the Gulf of Riga. The entire course is about 650 miles, of which a large part is navigable, except four months of the year, when it is frozen. Canals connect it with the Black and Caspian seas, the Gulf of Finland, and other navigation centers. The course of the Düna is through a fertile and densely populated region and its importance in commerce is marked, having Jacobstadt, Riga, and Friedrichstadt on its banks.

DÜNABURG (dü'nà-bo͝ork), or **Dvinsk,** a fortified city of Russia, in the government of Vitebsk, 110 miles southeast of Riga. It is situated on the Düna River and on the trunk railway from Warsaw to Saint Petersburg. The surrounding country is fertile. Among the manufactures are flour, matches, clothing, machinery, tobacco, and spirituous liquors. It has a large trade in produce and merchandise. The streets are well paved. It was bombarded by the French in 1812 and by the Germans in 1915 and 1916. Population, 1914, 112,783.

DUNBAR (dŭn'bär), **Paul Lawrence,** negro poet, born at Dayton, Ohio, in 1872; died Feb. 9, 1906. He graduated at the high school in Dayton and for a time worked on newspapers in New York City. In the meantime he began to write poems and appeared successfully as a public reader. W. D. Howells and others commended his writings on account of the genius displayed in the dialect and the humor characteristic of negro life. His writings include "Lyrics of Lowly Life," "Oak and Ivy Poems," "Lyrics of Love and Laughter," "Heart of Happy Hollows," "Lyrics of Sunshine and Shadow," and "Poems of Cabin and Field."

DUNBAR, William, Scottish poet, born at Salton, Scotland, about 1460; died about 1520. He joined the Order of Franciscans and traveled as a friar and itinerant preacher in his youth. In 1500 he was employed as clerk of embassy by James IV of Scotland. He possessed a variety of poetic gifts and many regard him the greatest of the Scottish poets. His writings include "The Thistle and the Rose," written in honor of the marriage of James IV. to Margaret of England, "The Dance of the Seven Deadly Sins," and "The Two Married Women and the Widow."

DUNDEE (dŭn-dē'), the fourth city of Scotland, in Forfarshire, fifty miles northeast of Edinburgh. It is situated on the Firth of Tay, about ten miles from its entrance to the sea, and is the center of a large railroad and navigation commerce. The streets are regular in most of the city and are well paved and lighted, and many are traversed by electric street railway lines. It has a safe harbor and extensive dockyards. Among the manufactures are textile goods, clothing, confectionery, earthenware, and machinery. It is the seat of extensive warehouses, flouring mills, and machine shops. The northern seal and whale fishery interests make it an important depot for operation, thus adding largely to its commercial importance. Among the noteworthy buildings are the Saint Paul's Episcopal Church, the post office, the county courthouse, the Kannaird hall, and the University College. In 1887 the large bridge, about two miles long, over the Tay, was blown down while a passenger train was passing over. The Firth is crossed farther up at present by a bridge 3,600 yards long. Dundee was besieged and sacked by the Duke of Montrose in 1645, and was stormed by General Monk about six years afterward. Its history in connection with Great Britain is quite interesting. Population, 1911, 165,006.

DUNE (dūn), the name first given to the hills of sand along the coast which are blown together by the winds, but later applied to sandhills formed similarly in regions of sandy or arid soil. Dunes begin to form where the sand is blown against some obstruction, such as a log or boulder, and from this beginning low hills are built up gradually. They are common on the sandy Atlantic coast of North America from Cape Cod to Cape Canaveral, where they are frequently from ten to thirty feet high, and on the coasts of the Bahamas they have a height of more than a hundred feet. In France, in the department of Landes, the dunes cover a large area and encroach farther upon the land each year. Others are found among the cliffs of England, near the southern end of Lake Michigan, and in extensive areas of the Sahara.

DUNEDIN (dŭn-ē'dĭn), a city of New Zealand, capital of the provincial district of Otago, on the east side of South Island. It is conveniently located at the head of Otago harbor, and has a large interior and domestic trade. A railway connects it with the principal cities of the island, and steamboats run regularly between it and Melbourne. It is the seat of Otago University, opened in 1871, and has street railways, waterworks, a public library, a fine post office, and several handsome government buildings. The streets are regularly platted and well paved with brick and stone. Among the manufactures are clothing, brick, pottery, utensils, and woolen goods. The first settlement

on its site was made in 1848, but its prosperity dates from 1861, when extensive gold fields were discovered in the vicinity. Population, 1911, 63,150.

DUNFERMLINE (dŭn-fĕrm'lĭn), a city of Scotland, in the western part of Fifeshire, sixteen miles northwest of Edinburgh. It has railroad and electric railway facilities. The manufactures include cotton and linen goods, ironware, pottery, clothing, and machinery. Lime beds and iron collieries are worked in the vicinity. It has a Carnegie public library, a fine high school, a public hall, and several county and corporation buildings. Dunfermline was a favorite residence of the early Scottish kings and is the birthplace of David II. and Charles I. Malcolm Canmore founded a Benedictine abbey here about 1075. The remains of Robert Bruce are beneath the pulpit of the Abbey Church. Population, 1906, 26,352; in 1911, 28,103.

DUNGLISON (dŭng'glĭ-sŭn), **Robley,** American physician, born in Keswick, England, Jan. 4, 1798; died in Philadelphia, Pa., April 1, 1869. In 1824 he emigrated to the United States, and served as professor of medicine in the University of Virginia until 1833. In 1833-36 he officiated as professor of medicine in the University of Maryland, and afterward occupied a chair in Jefferson Medical College, Philadelphia, for more than thirty years. Besides making numerous translations, he wrote "Dictionary of Medical Science" and "The Practice of Medicine."

DUNKARDS (dŭn'kĕrdz), a name derived from the German word *Tunkers,* meaning immersers, and by which a Protestant denomination is known. The society of Dunkards was founded at Schwartzenau, Germany, in 1708. It includes the Conservative, Old Order, and Progressive Baptists, and the German Seventh-Day Baptists. The entire Dunkard denomination comprises 1,095 churches, 2,885 ministers, and 118,875 members. It has the largest number of adherents in Ohio, Pennsylvania, Indiana, and the states in the Northwest. The publishing headquarters are at Elgin, Ill. Several colleges and seminaries are maintained. The bicentennial of the Progressive Baptists was held at Des Moines, Iowa, in 1908, when the society was renamed Church of the Brethren.

DUNKIRK (dŭn'kĕrk), a city and port of entry of Chautauqua County, New York, on Lake Erie, about 35 miles southwest of Buffalo. It is on the Erie, the New York Central, the Lake Shore and Michigan Southern, and other railroads. The noteworthy buildings include the public library, the high school, the Brooks Memorial Hospital, and the city hall. Many of the streets are paved and improved by grading and parkings. It was settled in 1809 and incorporated in 1837. Among the manufactures are flour, machinery, locomotives, clothing, lumber, utensils, and hardware. Population, 1905, 15,251; in 1910, 17,221.

DUNKIRK, or **Dunkerque,** a seaport in France, on the Strait of Dover, in the department of Le Nord. It is defended by forts and outworks, and surrounded by walls. The harbor is large and convenient. Among the manufactures are cordage, sugar, spirituous beverages, leather, soap, and machinery. Shipbuilding is an important industry. The railroad and electric car line connections are extensive. Among the public buildings are a library, the Church of Saint Eloi, the museum, and the town hall. Dunkirk owes its early growth to the church built by Saint Eloi in the 7th century. It has been attacked in many wars upon France, including the assaults of the English under the Duke of York, which was defeated. The Germans inflicted heavy losses by bombardments in 1914 and 1915. Population 1914, 40,210.

DUNMORE (dŭn-mōr'), a borough of Lackawanna County, Pennsylvania, on the Erie and the Lackawanna railroads. Extensive anthracite coal and clay deposits are worked in the vicinity. It is the seat of the State Oral School. Among the industries are steel and iron mills, stone works, feed mills, and implement works. It has gas and electric lighting, electric street railways, and municipal waterworks. The place was settled in 1835 and incorporated in 1862. Population, 1910, 17,615.

DUNMORE, John Murray, Earl, royal Governor of New York, born in England in 1732; died in 1809. He descended from the Stuarts, succeeded to the peerage in 1766, and became Governor of New York in 1770 and of Virginia the following year. His unjust rule led to an uprising under Patrick Henry, causing him to flee for safety in 1775. During the early part of the Revolution he conducted a petty warfare against the colonists, but returned to England in 1776. He was made Governor of the Bahamas in 1787, serving in that office until 1796.

DUNNE (dŭn), **Edward F.** See **Municipal Ownership.**

DUNNE, Finley Peter, humorist, born in Chicago, Ill., July 10, 1867. After obtaining a common school education in Chicago, he engaged as reporter for various newspapers, which line of work he followed in 1885-91. In the latter year he became editor of the *Times,* in 1892 engaged as a member of the staff of the *Evening Post* and of the *Times-Herald,* and in 1897 became editor in chief of the *Evening Journal.* While working on the staff of the *Times-Herald* he attracted considerable attention by publishing sketches in the name of Martin Dooley, publican of Archey Road, which were afterward issued in classified volumes. His treatment of news items in connection with the Spanish-American War was particularly popular. In ability to analyze fault and criticise foible humorously he has rarely been excelled. Among his publications are "Mr. Dooley in the Hearts of His Countrymen," "Mr. Dooley in Peace and in

War," "Mr. Dooley's Opinions," and "Mr. Dooley's Philosophy."

DUNS, John, or **Duns Scotus,** eminent minister, born in 1265; died in Cologne, France, in 1308. The locality of his birth is not known and it is not certain whether his birth took place in 1265. He studied at Oxford University, where he afterward became professor of theology, and was an active member of the Order of Franciscans. He had a long controversy upon the relation of human perception of real objects with Thomas Aquinas, and later upon various religious doctrines, and the disciples of these men became known respectively as Scotists and Tomists. The reasoning of Duns was to the effect that the knowledge derived from human conception and experience is real and trustworthy, since the fundamental ideas upon which human knowledge rests are identical with the absolute substance of existing objects. He held that philosophy is intended to show the conformity of the teachings of the Bible with those of reason. He opposed the Dominicans in defending the doctrine of the Immaculate Conception, which was declared a fundamental doctrine of the Catholic faith in 1854. His writings include commentaries on the Bible and on Aristotle, and he published a work generally known as "Commentary on the Sentences of Peter Lombard."

DUNSTAN (dŭn'stạn), **Saint,** Archbishop of Canterbury, born in Glastonbury, England, in 925 A. D.; died May 19, 988. He was of noble birth, being distantly related to the royal family and connected through influential relatives with the church. Most of his early history is uncertain, though it is known that he was a composer of music and skillful in playing upon various instruments. He appears to have worked with considerable skill as a jeweler, blacksmith, and calligrapher. It is said of him that he had his workshop, bedchamber, and oratory in a small room. According to legends, he was confronted by the devil while employed at the forge and was tempted by immoral propositions. Being greatly annoyed by these temptations, he thrust his tongs into the fire, and, when at a white heat, seized the fiend by the nose and caused his clamor of agony to resound through the entire neighborhood. After being educated at the abbey of his native town, he became a monk and was shown much favor by King Edmund. The saint distinguished himself as an adviser of the king, on account of which Edmund became a noted statesman.

When Edwy succeeded to the throne, in 955, Dunstan lost public favor, but he regained it when Edgar became the ruler of the country north of the Thames. The latter became king of the whole country after the death of Edwy and made Dunstan Archbishop of Canterbury. Having a potent influence over King Edgar, his reign became known as the most peaceful, prosperous, and successful in early English history. By a wise policy the Danes and English united under one dominion and the clergy was improved. All divines were induced to become real teachers of the people, and by a wise system promulgated knowledge and interest in the sciences and arts. The coinage of money was largely reformed and dangerous wild animals in the mountains were extirpated. King Edgar supported his ambitions to extend celibacy among the clergy by establishing and maintaining the strict rule of Benedictine monasteries. With the death of Edgar the influence and credit of the monk rapidly declined and his life was ended in great grief and vexation.

DUPLEIX (dü-plâ'), **Joseph François,** soldier and statesman, born in Landrecies, France, Jan. 1, 1697; died Nov. 10, 1764. He was appointed to a seat in the council of Pondicherry in 1720, and soon after attained promotion to other important positions. His administration of public affairs in India was so eminently successful that the British became alarmed and a war broke out between England and France. Being popular and progressive, both in government and military management, he became ambitious to found a French empire in India on the ruins of the Mongol monarchy. He soon assumed control of affairs in Central India, made himself master of Hyderabad, and became the controlling influence in the Carnatic. A severe struggle between the English and French continued until 1754, when he was recalled. If he had succeeded in securing the hearty support of the French Company, it is likely that India would still be a French possession. The fortunes of war were so strongly against him in the latter part of his life that he died in poverty and neglect.

DUPONT (du-pŏnt'), **Samuel Francis,** naval officer, born at Bergen Point, N. J., Sept. 27, 1803; died in Philadelphia, Pa., June 23, 1865. He entered the navy as a midshipman at the early age of twelve years, was promoted successively, and retired from the navy in 1863 with the rank of rear admiral. He served with distinction in the Mexican War and took a prominent part in the first three years of the Civil War. In the latter he commanded the South Atlantic squadron. A treatise on the use of floating batteries for coast defenses was published by him. This work is still valued highly as an authority.

DÜPPEL (düp'pẹl), a village of Germany, in the Prussian province of Schleswig-Holstein, sixteen miles northeast of Flensburg. It is located on the coast of the Little Belt, is strongly fortified, and has importance as a strategic point. In the war between Prussia and Denmark, in 1849, it was stormed and captured by the Germans. A second engagement took place at Düppel in 1864, when the Germans bombarded the Danish position and captured it after a siege of two months.

DUPRÉ (du-prā'), **Jules,** noted painter, born

in Nantes, France, in 1812; died in Paris, Oct. 6, 1889. He was self-educated in the arts, and first attracted attention by exhibiting five landscapes at the salon in 1831. Critics of his time accorded him the highest rank as a portrayer of field life. Among his best productions are "The Sluice," "The Return of the Flock," "The Landscape," "The Interior of a Courtyard," and the "Valley of Montmorency."

DUPUY (dụ-pwē'), **Charles Alexandre,** statesman, born in Le Puy, France, Nov. 5, 1851, After attaining his education, he commenced a successful career as teacher. His eminently able work gave him high standing and led to his promotion as inspector of public instruction. In 1885 he was elected a deputy for Haute-Loire and was reëlected several terms. He served as minister of public instruction in the Ribot cabinet and was appointed minister of the interior by President Carnot in 1893. In the same year he was elected president of the chamber of deputies and soon after became premier. He was elected senator for the department of Haute-Loire in 1900. In politics his career shows a decided tendency to the republican party and opposition to the influence of the priests.

DUQUESNE (dü-kān'), a borough in Allegheny County, Pennsylvania, about ten miles southeast of Pittsburg, on the Monongahela River and on the Pennsylvania Railroad. The chief buildings include the high school and the Carnegie Library and Institute. It is an important manufacturing center and has a growing trade in coal and merchandise. The manufactures embrace ironware, machinery, earthenware, cigars, and utensils. It has modern municipal improvements, such as pavements and waterworks. Duquesne was settled in 1885 and incorporated in 1891. Population, 1910, 15,727.

DURAND (du-rănd'), **Asher Brown,** engraver and artist, born in Jefferson, N. J., Aug. 21, 1796; died Sept. 17, 1886. In 1812 he was apprenticed to an engraver, and became known throughout the United States by his "Declaration of Independence," which was a reproduction from Trumbull. In 1835 he turned his attention to painting. Many of his productions take high rank. He was president of the National Academy of Designs from 1845 to 1861. Among his best paintings are "The Capture of André," "The Wrath of Peter Stuyvesant," "The Trysting Tree," and "Harvey Birch and Washington." •

DURANGO (dōō-rän'gō), a city of Mexico, capital of the state of Durango, 475 miles northwest of the city of Mexico. The city is well built on an elevation 6,845 feet above sea level, has manufactures of cotton and woolen fabrics, leather, and machinery, and is the seat of a government mint and a cathedral. It has several fine school and church buildings. Mining, agriculture, and stock raising are carried on in the vicinity. It has railroad connections and a considerable trade. Population, 1910, 34,085.

DURANGO, county seat of La Plata County, Colorado, on the Las Animas River and on the Rio Grande Southern and the Denver and Rio Grande railroads. It is surrounded by a fertile country, which yields large quantities of agricultural products and contains extensive coal deposits. The noteworthy buildings include the high school and the county poorhouse. It has a considerable trade, and it is the seat of iron and steel works. Population, 1910, 4,686.

DURANT, county seat of Bryan County, Oklahoma, 120 miles southeast of Oklahoma City, on the Missouri, Kansas and Texas and other railroads. It is surrounded by a fertile region and has paving, oil mills, machine shops, and flour mills. The city hall, high school, and several fine churches are among the features. It was settled in 1887. Population, 1910, 5,330.

DURANT (dû-rănt'), **Henry Fowle,** philanthropist, born at Hanover, N. H., Feb. 20, 1822; died Oct. 3, 1881. He graduated at Harvard University in 1841. He founded Wellesley College, at Wellesley, Mass., to which he gave nearly $2,000,000. Originally his name was Henry Welles Smith.

DURBAN (dûr-băn'), an important seaport of South Africa, the only port city of Natal, on the Bay of Natal. The bay has a lighthouse and is protected by fortifications. It has a public library, a museum, electric street railways, and a fine public park, and is the terminus of two railway lines. The domestic and export trade are important. It has manufactures of clothing, brick, utensils, and machinery. Durban was founded in 1823 by the Dutch. Population, 1911, 69,187.

DÜRER (dü'rẽr), **Albrecht,** engraver and artist, born in Nuremberg, Germany, May 30, 1471; died April 6, 1528. He was the son of a pious goldsmith, received a good education, and was instructed in the goldsmith trade. At the age of fifteen years he executed a production in chased silver representing the seven falls of Christ, in accord with the tradition that Christ fell seven times on his way to Mount Calvary while bearing the cross. Soon after he spent four years traveling in Germany and the Venetian states, studying the arts and industries. Later he began to design on wood and engrave on copper, many of his pieces still being extant. He made a second tour to Venice in 1505, where he painted a picture of the martyrdom of Saint Bartholomew and his famous "Adam and Eve," the latter being afterward purchased for the gallery of Prague. At Bologna he met with



ALBRECHT DÜRER.

Raphael, who esteemed him highly and exchanged portraits with him. After this journey he was appointed court painter by Emperor Maximilian.

Dürer visited the Netherlands in 1520, painted the portrait of Erasmus, and became court painter to Charles V. His productions were received with much enthusiasm, not only by the common people, but by the most eminent nobles and crowned heads of his time. His expenses were defrayed at the inns by his admirers, and he was conveyed free from city to city. He became a supporter of the doctrines of the Reformation, and greatly lamented when he was informed of Luther being carried off to the castle of Wartburg. The most celebrated of his copperplates are "Saint Jerome in his Study" and "The Smaller Passion." His woodcuts include "The Smaller Passion," "The Greater Passion," and "The Apocalypse." Much has been said and written of his remarkable genius. He is commonly known as the "Prince of Artists."

DURHAM (dŭr'ŭm), county seat of Durham County, North Carolina, 26 miles northwest of Raleigh. It is on the Seaboard Air Line, the Southern, and the Norfolk and Western railroads. Among the chief buildings are the county courthouse, the public library, the Watts Hospital, and Trinity College. It is surrounded by an agricultural country and has a large trade in produce and merchandise. The manufactured products include tobacco, furniture, cotton and woolen goods, flour, ironware, machinery, and implements. Durham was settled in 1855 and incorporated in 1869. General Johnston surrendered with a Confederate army to General Sherman near the city in 1865. Population, 1900, 6,679; in 1910, 18,241.

DURHAM, a city of England, situated near the center of Durham County, on the Wear River. It occupies a site partly encircling a steep, rocky eminence, on the top of which are a castle and a cathedral. The ancient castle is now used by the university, which was founded in 1832 and incorporated by royal charter in 1837. Durham first became important in 995, when a church was located here to enshrine the tombs of Saint Cuthbert and others. The present cathedral was begun on the site of the old church in 1093, and constitutes one of the most characteristic specimens of Norman architecture. The main building has a length of 510 feet and the central tower is 214 feet high. The bishopric of Durham is celebrated for its efficient line of bishops, who exercised marked influence upon the religious aspect of Great Britain. Population, 1917, 15,382.

DURHAM, John George Lambton, statesman, born in London, England, April 12, 1792; died on the Isle of Wight, July 28, 1840. He studied at Eton and entered the army. In 1813 he was elected to Parliament as a Whig, but was later classed as an advanced Liberal, and in 1828 was created Lord Durham. He became Lord Privy Seal in the Cabinet of Earl Grey in 1830, and supported the reformed bill of 1831 in the House of Lords. In 1835 he was made ambassador to Russia and three years later became Governor General of Canada, where a rebellion was in progress, which he sought to overcome. The government disapproved of his measures and he returned to England in 1839. Durham fostered a liberal policy looking toward a union of Upper and Lower Canada, which he favored in a report of Canadian affairs submitted to the government.

DURYEA, Joseph Tuthill, clergyman and lecturer, born in Long Island, New York, Dec. 9, 1832; died in Boston, May 17, 1898. He was educated at Princeton College and Princeton Seminary, and was teacher of Greek at the former until 1859. Soon after he was called as minister by a Presbyterian congregation in Troy, N. Y., where he officiated three years, then went over to the Collegiate Reformed Dutch Church in 1862, but reunited with the Presbyterians in 1867. Later he secured much success in the ministry at Boston and Omaha, Neb., remaining in the latter city from 1888 to 1895, and returning again to Brooklyn as pastor of the First Reformed Church. He was well known as an eminent divine and a popular and successful lecturer.

DUSE (dōō'zā), **Eleonora,** actress, born in Vigevano, Italy, in 1859. She appeared on the stage at the age of thirteen years, and for some time earned her living as a strolling player. Her early appearances were not attended with a great degree of success, but in 1885 she was recognized at Naples as one of the leading actresses of Italy. In 1892 she made an international reputation by playing at Vienna, and the following year scored successes in New York and Boston. In 1897 she played in Paris and came to be looked upon as a rival of Sarah Bernhardt. Subsequently she toured the leading cities of Europe and America, playing with much success in the presentation of *Camille, Juliet, Fernande, Francesca da Rimini,* and *Paula* in "The Second Mrs. Tanqueray." She obtained success in several plays written for her by Gabriele d'Annunzio.

DÜSSELDORF (düs'sẹl-dŏrf), a city of Germany, in Rhenish Prussia, on the Rhine River, at the mouth of the Düssel. It has communication by lines of steamers, steam railroads, and electric railways, and is one of the leading commercial centers in the valley of the Rhine. Among its manufactures are carpets, tobacco, cotton and woolen goods, leather, ironware, chemicals, machinery, musical instruments, and objects of art. The cotton and iron industries are very extensive and merit special mention. It has a large export and jobbing trade.

Düsseldorf is noted as a center of art and education. The Academy of Art is one of the

leading institutions of the kind in Europe. It was founded in 1767 and contains paintings by Rubens, Bellini, Dürer, Janssens and other famous artsts. Among the noteworthy buildings are the palace of justice, the Church of Saint Lambert, the museum, and a number of gymnasiums. Among the public parks may be mentioned the Hofgarten, one of the finest in Europe, and within it are several fine monuments, including the War Memorial erected in 1892 to commemorate the campaigns against Austria and France. Düsseldorf was first mentioned in the 12th century. It was annexed with the Grand Duchy of Berg to Prussia in 1814. Population, 1905, 253,274; in 1910, 357,702.

DUTCH, the language and people of Holland, or the Netherlands. The name was originally applied to most of the Teutonic peoples, but beginning with the 17th century the people of Holland were designated as Dutch and all others of the Teutonic order as Germans.

DUTCH EAST INDIES, the territory of the East Indies under the control of the government of Holland. These possessions comprise Java and Madura; parts of Borneo, Sumatra, and New Guinea; the Riau-Lingga Archipelago, Banca, Billiton, Celebes, the Molucca Archipelago, and the Sunda Islands. The entire area is estimated at 736,500 square miles and the population at 35,095,500, of which about 75,000 are Europeans. As a whole it has remarkable fertility of soil and extensive productions of rice, coffee, sugar, tobacco, cotton, indigo, minerals, spices, and fruits. Many minerals abound, but the mines are not worked extensively. The government is administered by a governor general, who is appointed by the crown and assisted by a council of five members. Most of the islands are treated under separate titles, which see.

DUTCH GUIANA (gē-ä′nȧ), or **Surinam,** a possession of Holland in South America. See **Guiana.**

DUTIES, a term which signifies taxes, but in general use it is restricted to taxes levied upon imports and exports, and has much the same meaning as customs. *Ad valorem* duty is the duty levied upon imported merchandise at a given per cent. as invoiced by the importer. A *specific duty* is the duty chargeable on imported merchandise by quantity, weight, or number, without regard to value. The term *duty on water* is applied to the charges levied on water used in the irrigation of crops. See **Customs Duties; Tariff.**

DUYCKINCK (dī′kĭnk), **Evert Augustus,** author, born in New York City, Nov. 23, 1816; died Aug. 13, 1878. He graduated at Columbia College and studied law, but devoted himself to literature. His early writings were in the form of contributions to periodicals, and in 1840-42 he joined Cornelius Matthews in editing the monthly magazine *Arcturus.* In 1847-53 he and his brother George Long Duyckinck (1823-1863) edited "The Cyclopedia of American Literature." Subsequently he published "National Gallery of Eminent Americans," "History of the War for the Union," and "History of the World." His brother is the author of "Life of Jeremy Taylor," "Life of George Herbert," and "Life of Bishop Thomas Ken."

DVINA (dvē-nȧ′), or **Dwina.** See **Dwina.**

DVORÁK (dvôr-zhäk′), **Antonin,** musical composer, born in Mühlhausen, Bohemia, Sept. 8, 1841; died May 1, 1904. His father was a butcher and innkeeper. He first learned music from the gypsies and was taught to play on the violin by his teacher in the public school. At the age of sixteen years he entered the Prague Conservatoire, and was afterward appointed as an aid to the minister of public instruction. In 1872 a number of his productions were given in Berlin with much success, and in 1885 his "Spectre Bride" was received with enthusiasm at the Birmingham Festival, in England. Cambridge University conferred upon him the honorary degree of doctor of music in 1891. Subsequently he filled extended engagements in Berlin and Vienna with marked success, and in 1892 visited Canada and the United States. His cantata entitled "Columbus" was given successively at the Metropolitan Opera House in New York, where it attracted much favorable mention. The composition, "Stabat Mater," is one of his first great productions. Other works include "The King and the Collier," "In Nature," and "The Heirs of the White Hills."

DWARF (dwȧrf), a term used to designate any plant or animal that is much smaller in size than the average size of development. Individual dwarfs occur in all plant and animal life, though those of the human race have attracted the greatest share of attention and study. Charles I. of England had a dwarf, Jeffery Hudson (1619-1682), who was only eighteen inches high at the age of seven years, but afterward grew to three feet ten inches. Wybrand Lolkes, a dwarf born in the Netherlands in 1730, was 27 inches tall at the age of sixty years, weighing 56 pounds. These and other celebrated dwarfs were kept as pets in the courts of princes and families of nobles. Dwarfs are now shown at exhibitions. Among the most celebrated dwarfs of America was Charles S. Stratton, known as General Tom Thumb. In 1863 he married Lavinia Warren. He was 31 inches in height and his bride was about one inch taller. Together with their dwarf child and Commodore Nutt, they were exhibited extensively in America and Europe. A dwarf of New York known as General Mite was only 21 inches tall.

Many of the dwarfs are unusually strong for their size and exhibit considerable intelligence. Several races of dwarfs are mentioned in history and some still exist. Aristotle described a race of dwarfs who inhabited caves on the banks of the Nile. The Akkas. who inhabit

Central Africa, are among the most noted of existing dwarf races. They were described by Stanley in 1881 as a brave people, though their average height does not exceed four feet ten inches. Several communities of dwarfs dwell in the Congo Free State, though they are more or less mixed with other tribes. The old Germanic legends mention numerous dwarf nations who had kings and a recognized form of government. It is quite probable that any of the stories met with as to their advancement in arts and sciences have been greatly exaggerated.

DWARFING, the process of training plants for ornamentation and useful purposes whereby their size is kept much below the normal. The process includes a special manner of planting, pruning of the roots, and pinching off of the stronger shoots. The art is practiced most extensively in China and Japan, where dwarfing is applied to ornamental trees and hedges. Besides pruning the stronger shoots, the limbs are bent and twisted in various ways and trained to develop into ornamental and beautiful forms. Some plants do not possess the characteristics which make them serviceable for dwarfing, even in fertile soil and under favorable climatic conditions. The osage orange, the acacia, and the arbor vitae are commonly dwarfed for hedges. Some fruits and the coffee tree yield larger returns when they are kept trimmed.

DWIGHT (dwīt), **Theodore,** journalist, born in Northampton, Mass., Dec. 15, 1764; died July 12, 1846. He was the brother of Timothy Dwight (1752-1817) and the grandson of Jonathan Edwards. He studied law and was admitted to the bar, and took part in politics as a Federalist. In 1806 he was elected to Congress, was secretary of the Hartford Convention in 1814, and the following year became editor of the Albany *Daily Advertiser.* He founded the New York *Daily Advertiser* in 1817, when he removed to New York City. His books include "A History of the Hartford Convention" and "Life and Character of Thomas Jefferson as Exhibited in His Own Writings."

DWIGHT, Theodore William, lawyer, born in Catskill, N. Y., July 18, 1822; died June 29, 1892. He was the son of Theodore Dwight (1764-1846), a celebrated American journalist, who attained much success as a statesman and writer. The son graduated at Hamilton College in 1840, and for some years was professor of political economy in that institution. Later he became professor of municipal law in Columbia College and lectured on law in Amherst and Cornell universities. His influence as a writer was marked, especially along the lines of reform. Among his publications are "Trial by Impeachment" and "American Political Institutions."

DWIGHT, Timothy, eminent educator, born in Norwich, Conn., Nov. 16, 1828. In 1849 he graduated from Yale and later studied theology for several years. In 1856-58 he studied in Berlin and Bonn, Germany. On his return to America he became professor of sacred literature in Yale Theological Seminary and was made president of Yale in 1886, which position he resigned in 1899. He is the author of a number of text-books, was influential as a lecturer, aided in revising the Bible, and was connected editorially with the *New Englander.* His chief publication is "The True Ideal of an American University." He died May 26, 1916.

DWIGHT, William Buck, scientist, born in Constantinople, Turkey, May 22, 1833. He was the son of Harrison Gray Otis Dwight (1803-1862), an American missionary. In 1849 he came to the United States and graduated at Yale University in 1854, and subsequently attended Union Theological Seminary and Yale Scientific School. He spent several years in examining mines in West Virginia and in 1867 became a teacher at West Point, and was made one of the two university examiners for the State of New York in 1894. Much time was given by him in making investigations of limestones in New York, especially in the Wappinger Valley. He contributed to periodical literature and published a number of works relating to geology. He invented a machine for cutting minerals and fossils into thin sections and edited the department of geology in the "Standard Dictionary."

DWINA (dwē'nà), or **Dvina,** an important river of northern Russia. It is formed by the junction of the Jug and Sukhona, has a northwesterly course, and flows into the White Sea by four mouths. It has a length of about 435 miles from its mouth to the point at which it is formed, and about 750 miles to the source of the Sukhona. The Vytchegda is the largest tributary. The entire system drains an area of 140,000 square miles, affords valuable means of inland navigation, and is rich in valuable fish. Large vessels cannot enter from the sea owing to shoals at its mouth, and it is obstructed by ice for about 175 days in the year. At Archangel it is four miles wide. Canals connect it with the Neva and the Volga.

DYAKS (dī'ăks), the name applied to the aborigines of Borneo, who chiefly inhabit the interior. They have made considerable advancement in agriculture and other arts. Their complexion is yellow, and in docility and industry they rank far above the Malays. In worship they are classed as pagans. Considerable advancement has been made in civilization, especially in the vicinity of Sarawak. The former practice of head hunting, an art in which they engaged to secure the heads of their enemies, has been abolished in all districts where Europeans have exercised influence. Most of the Dyaks are under the government of Holland.

DYEING, the art of fixing colors on linen, cotton, silk, wool, and other textile fabrics. Owing to a marked difference in which fibrous materials take color, it is necessary to pass the substances to be dyed through various preliminary operations. All matters preventing the dye from having free access, and the natural coloring that interferes with the production of the clear and bright tints, are removed. Bleaching is applied to linen and cotton fabrics before bringing them in contact with dyes, while silk is boiled to remove the fatty matter, and wool is scoured in soda, lye, diluted ammonia, or weak soap. The order in which substances have attraction for color is: wool, silk, cotton, flax, and hemp. Dyes are often applied to woolen goods before weaving, in which case they are called *wool-dyed.* If the coloring matter is applied after weaving, they are called *piece-dyed.* Some dyes will not adhere to the materials which are to be colored without an agent to fix them, that is, to cause a combination between the dyeing color and the stuff to be dyed. Such an agent is known as a *mordant.*

The dye materials used at present are derived from the mineral, vegetable, and animal kingdoms. The most common mineral dyes are known as arsenical greens, chrome yellow, cobalt blues, and Prussian blues. Vegetable dyes of different kinds are derived from Rubia tinctoria, munjeet, sandalwood, logwood, sappanwood, and Brazilwood. Animal dyes include those made from the cochineal insect and kindred species of insect life. In recent years aniline dyes derived from coal tar have been added to the list of coloring stuffs. Under various forms of treatment many organic substances yield coloring matter. Among them may be mentioned starch, lichens, wood, sawdust, cotton waste, mosses, soot, sugar, camwood, sumach, French berries, saffron, and turmeric.

DYER'S BROOM, or **Dyer's Weed,** a low and shrubby leguminous plant native to many parts of Europe. It has simple leaves and yellow flowers and is reputed to be the Genêt, a bush from which the Plantagenet family obtained its name. The tops are used in making a yellow dye, and it is said to possess medicinal properties useful in preventing hydrophobia. This plant has been naturalized in some parts of Canada and the United States.

DYNAMICS (dī-năm'īks), the science which treats of the action of forces. It is divided into statics and kinetics. *Statics* treats of forces that counterbalance each other, and which therefore produce no motion or change of motion; while *kinetics* treats of forces that do not counterbalance, and therefore cause motion or change of motion. The whole science is generally called *mechanics,* while dynamics is restricted to the branch commonly called kinetics. The three primary laws of force were first stated by Newton, and express the principal phenomena of mass motion. These are: 1. A body at rest will continue at rest, or a body in motion will continue in motion in a straight line with a uniform velocity, until acted on by some external force. 2. Any change in the direction or in the amount of motion is proportional to the force acting, and takes place in the direction in which the force acts. 3. Action and reaction are equal in amount and in opposite directions.

The first law is sometimes called the law of *inertia,* being a mere statement of the property of inertia. Matter at rest will continue at rest; or, if in motion, it must continue moving until it is acted on by some force, for the reason that it has no ability to start itself moving, to stop moving, or to change the direction of its motion. The second law states the principle that the amount and character of motion produced by any force depends upon the elements of a force. An equal force, acting on two masses, one twice as large as the other, imparts to the smaller mass a motion twice as great as to the larger. From this we notice that the amount of motion of a mass or body depends upon the quantity of matter the body contains, as well as upon the intensity of force causing its motion. The amount of motion a body possesses is called its *momentum,* which is equal to the mass of the body multiplied by its velocity. The principle declared in the third law is well illustrated by the recoil or kick of a gun, when a ball is shot from it. The motion in the gun is equal to that of the ball and is opposite in direction, but the actual velocity imparted to the gun is comparatively small on account of its mass being much greater than that of the ball. Hydrostatics is included in dynamics, when a wide construction is applied to the term.

DYNAMITE (dī'nà-mīt), a powerful explosive compound invented by Alfred Nobel, a German chemist, in 1867. The name is from a Greek word meaning strength. It was first produced by combining nitroglycerin with a siliceous earth obtained at Oberlohe, in Hanover, and known in Germany as *Kieselguhr.* Nitroglycerin was discovered by an Italian in 1846, but was not brought into practical use until the invention of dynamite. The proportion of nitroglycerin mixed with kieselguhr is seventy-five per cent., the mixture being made to diminish the liability of the nitroglycerin exploding by shock, and not destroying its force as an explosive. This earthy matter is highly porous and friable, thus containing high absorbent power. The color of dynamite is reddish-brown and has much the appearance of raw sugar. Other substances are now used to form dynamite, many being superior to kieselguhr for some purposes, among them diatomite, sand, charcoal, and sawdust.

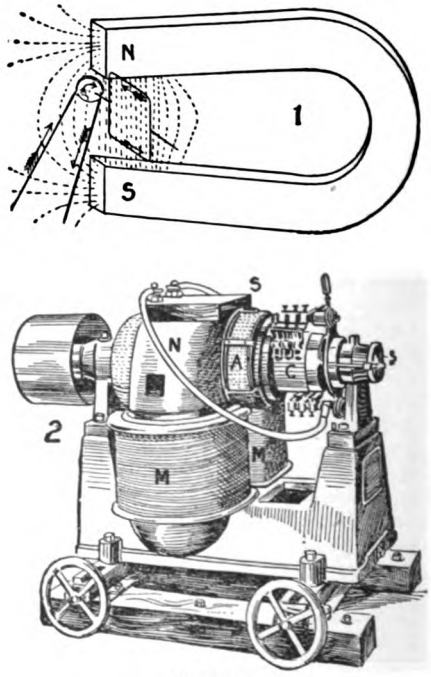
Dynamite is not impaired by age unless exposed to water. Small quantities may be

burned without danger and give off a yellowish flame, but an explosion results if it is heated to a high temperature. As an explosive force it is several times more powerful than gunpowder, the explosion being effected by a fulminating cap. It is used extensively for blasting bowlders and may be employed under water, though about six per cent. of its power is lost when exploded in a submerged state. On account of its tendency to break rock into particles, it is not used for quarrying, gunpowder still serving for that purpose. *Gun cotton* is a mixture of nitroglycerin and cotton or wood cellulose, and has the appearance of soft gelatin. It is used for some forms of tunneling and blasting in preference to dynamite, on account of giving off less fumes and having no tendency to cause headache to operators.

Dynamite has gone into use for firing guns in warfare, a dynamite gun suitable for that purpose having been invented in 1883. The dynamite gun made under the direction of Lieutenant Zalinski consists of a mechanism in which a tube from forty to sixty feet in length is utilized. This tube is supported by a truss frame to guard against warping by its own weight, and the dynamite projectiles are thrown from the tube by means of compressed air. The compressed air is stored in a chamber beneath the gun carriage, its pressure being usually 4,000 pounds, though not more than 2,000 pounds of effective pressure is applied in throwing the projectile. Usually the air is introduced back of the projectile at an effective pressure of 2,000 pounds, and is increased as the projectile moves forward in the tube, this being done as a safeguard against sudden explosion. By means of this arrangement dynamite projectiles may be thrown a distance of three miles, the destruction being effected when they explode by reason of the sudden jar with which they crash against a fortification or some other object at which they are aimed. Another dynamite gun is the Maxim-Schupphaus, in which a special powder starts the projectile with a low pressure and increases the velocity by maintaining pressure throughout the entire length of the gun. This gun is among the latest that has attracted attention and has given marked satisfaction, though there are others that have been used successfully in throwing dynamite projectiles and aërial torpedoes. Guns of this character were first successfully employed in actual battle during the attack on Santiago by the American forces in the war with Spain, but since then have had an extended use elsewhere.

DYNAMO ELECTRIC MACHINE, a machine for generating electricity by mechanical action, or for transforming electrical energy into mechanical energy. This is the definition of a dynamo-electric machine, which may serve either as a *generator* or a *motor,* depending upon whether it is supplied with mechanical or electrical energy; hence, whether it is giving out electrical or mechanical energy.

In Fig. 1 are shown the essential parts of a simple dynamo. Here the two magnetic poles, N S, of opposite polarity, are placed near to each other. Between the poles is a field of so-called lines of magnetic force, which are represented in the illustration by dotted lines. As the pulley C is revolved rapidly in the magnetic field, it cuts the lines of force and an electro-motive force is induced in the conductor. However, the magnitude of the electro-motive force in the conductor depends entirely upon the rate at which the lines are cut. Since one end of the conductor is raised to a higher electric potential than the other, owing to this electro-



DYNAMO.

motive force, there is a tendency for electricity to flow along the conductor. If the ends of the conductor are connected exterior to the magnetic field so as to form a closed circuit, a current will flow through it as is indicated by the two arrows in the illustration.

In a dynamo, as shown in Fig. 2 of the illustration, is an *armature,* A, of soft iron, around which a large number of wires are wrapped, the armature being revolved rapidly between the poles N and S of the large magnets M and M. By these means a current of electricity is induced which is conducted along the axis of the armature and taken up by brushes of metal and conducted over wires to the lamps or motor intended to be operated.

The *commutator,* C, is fixed on the collar

of the axis on which the armature revolves, and by means of it the direction of the current is reversed. In some machines the commutator causes the currents to be continuous or to have the same direction. The power of the machine depends upon the number of magnetic poles, within which the armature is moving, and the speed of rotation.

The effect of a dynamo is practically the same as that of a magneto-electric machine, but they differ in construction in that the latter has a permanent steel magnet instead of the electro-magnets used in dynamos. The dynamo is superior in that it possesses greater compactness, due to the fact that electro-magnets are stronger than permanent steel magnets of equal bulk. Their extensive use dates from the improvements made in their construction by Gramme of Paris in 1870. His invention became known as the Gramme machine, by means of which a powerful continuous current of uniform strength was obtained. Among the greatest dynamos ever built are those of Deptford Central Station, in London, and at Niagara Falls, the latter being propelled through the motive power of water wheels. At the Columbian Exposition there were twelve dynamos that weighed 900 tons, had a capacity of 180,000 lights, and were operated by engines with an aggregate of 12,000 horse power. Since then other notable dynamos have been constructed, those used at the London, England, exposition in 1908 being particularly noteworthy.

DYNAMOMETER (dī-nȧ-mŏm'ē-tĕr), an instrument to ascertain the strength of men and animals, and to determine the power exerted by machines. Three classes of dynamometers are in use, including those designed to indicate the force of *thrust*, of *traction*, and of *rotation*. A thrust dynamometer is attached to the screw shaft of a steamship and measures the force of the screw in driving the vessel through the water. A simple traction dynamometer consists of a spring balance, in which the power exerted is indicated by an index upon a scale of figures. It may be fastened to a wagon or a plow, and when the team of horses pulls the load it shows the force exerted. The force of a shaft is measured by a rotary dynamometer, indicating the force transmitted by the shaft to other machinery.

DYNASTY (dĭ'nąs-tў), a succession of sovereigns in one line of family descent, or derived from the same ancestral stock, and who govern the same country. Among the particularly noteworthy dynasties are the Hohenzollern of Germany, the Hapsburg of Austria, the Stuarts of England, and the Castile of Spain.

DYNE (dīn), the absolute unit of force, employed in the metric system for measuring force. It is termed the unit of the centimeter-gram-second system (C. G. S.), and is equal to a force that, acting upon one gram of matter for one second, will give it a velocity of one centimeter per second. Since the dyne is a small unit, it is more convenient to use the *megadyne*, which is equal to one million dynes.

DYSODILE (dĭs'ō-dīl), a mineral closely related to amber, found chiefly in limestone. It is of a yellowish or grayish color, and emits an odor similar to that of assafoetida when burning.

DYTICIDAE (dī-tĭs'i-dē), a family of water beetles which embrace nearly a thousand species. The body is flattened and the hind legs are furnished with hairs to aid in swimming. They pass the winter in a dormant state by being concealed in thick tufts of herbage or in mud, and become active in early spring. The antennae are smooth. Their habits are active, both in swimming and in flying from one pond to another.

DZIGGETAI (dzĭg'gĕ-tā), a wild ass found on the plateaus of Central Asia, which resembles the horse more than any other animal. The color is brown and a black stripe extends along the back. Naturalists regard this animal of the same family as the kiang and koulan. It is thought to be the "half ass" mentioned by Pliny and Herodotus.



E, the fifth letter and the second vowel of the English alphabet. It is used more frequently than any other of the 26 letters. Its natural or long sound is the same as *i* in the German, Italian, and French languages, as in *me, mere,* and *here.* The short sound of *e* is represented in words like *men, hen,* and *met,* while its sound equivalent to *a* is exemplified in *there.* Several modifications are recognized when long and short *e* are followed by *r,* as in *here* and *her;* and the *u* or *dropped sound,* as in *camel.* In pronouncing it the mouth is opened to a medium extent, the tongue is expanded to touch the upper molars, and the voice is gently expurgated. It is generally silent as a final letter, but serves to lengthen the preceding syllable, as in *plume, cane, mane,* though in some cases it exercises no influence on the preceding vowel, as in *give* and *gone.* The final *e* was pronounced in most cases up to the end of the 14th century, as is the case in Chaucer's "Canterbury Tales."

In music it is the third note of the diatonic scale of C. *E,* as a key in music, has four sharps in its signature, F, C, G, and D sharp; but minor E, as a key, has but one sharp, F. The abbreviation E. signifies East.

EADS (ēdz), **James Buchanan,** noted engineer, born in Lawrenceburg, Ind., May 23, 1820; died in the Bahama Islands, March 8, 1887. He settled at Saint Louis in 1833 and became a clerk on a steamboat six years later. In 1842 he designed a diving bell. Later he constructed several boats for raising large steamers, employing them in the Mississippi, and established the first glassworks west of the Mississippi River in 1845. When the Civil War commenced, he was called by President Lincoln to aid the national government, and constructed eight ironclads in about three months, these steamers being employed in the capture of Fort Henry. Later he built other ironclads and mortar boats. He commenced the construction of the steel-arch bridge across the Mississippi River at Saint Louis in 1867, at which he worked seven years. Subsequently he deepened the Southern Pass at the mouth of the Mississippi River by means of jetties, and planned the deepening of the river from its mouth to the mouth of the Ohio. Later he organized a company and engineered the building of a ship railway across the Isthmus of Tehuantepec, and was connected with other large enterprises. The British Society of Arts awarded him the Albert medal in 1884.

EAGLE (ē'g'l), the name by which many birds of prey are known. They are classed in the genus *Aquila* and the family *Falconidae,*



BALD EAGLE.

with which the eagles, falcons, and hawks are included. Eagles are regarded the most noble and courageous of the rapacious birds, and soar higher than any other birds of flight. The *golden eagle* has a dark, tawny-brown color, with a yellowish tinge on the back of the head and neck, and is a large and beautiful

bird. It attains a length of about three feet and is able to seize any kind of poultry, rabbits, and small quadrupeds and carry them to its nest in the rocky ledges and cliffs of mountains. This species is a common bird of many regions of Eurasia and North America. The *sea eagle* is found near the coasts of lakes and seas and feeds largely on fish and marine life. It has a grayish-brown color, white tail, and pale-colored head. The *bald eagle* is found in America and northern portions of Eurasia, and has been adopted as the symbol of the United States and some other countries. Its general diet is more extended than that of the *tree eagle,* and carrion is even taken in time of need. The *serpent eagle* is found in Southern Asia and Northern Africa, and in structure and habits approaches the buzzard. Other species include the *imperial eagle,* the *eagle hawk,* and the *crested eagle.* These birds are fond of fish and commonly feed on the dead fishes found along the shore. They are frequently seen in pursuit of the osprey and other birds, requiring them to drop the fish they may have caught.

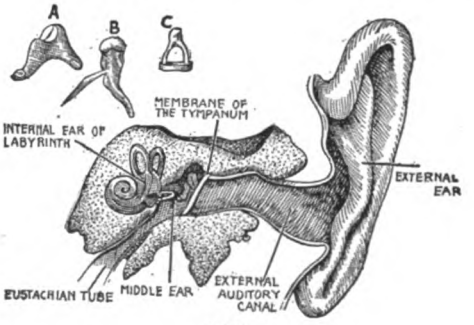
EAGLE, the bird most noted as a symbol of societies and nations. The Persians bore an eagle as a symbol upon a spear in battle as early as 401 B. C., and from them it passed as a war standard to the Egyptians. Among the Romans it was customary to use eagles of silver as a standard and rarely of gold, the custom being introduced among them in 104 B. C. The dynasty of Napoleon adopted the eagle as a symbol for France. A double-headed eagle was introduced as the emblem of Russia, and Charlemagne introduced it into Germany as a standard. The Russians have an association known as the White Eagle Order of Knighthood, and in the German Empire are Orders of the Black, Golden, and Red Eagles.

The Prussian Order of the Black Eagle was founded by the elector of Brandenburg in 1701, and is still maintained with a degree of marked respect. Its decoration consists of a Maltese cross surmounted by a royal crown. This cross is given for meritorious service by the emperor. The double-headed eagle is maintained as the standard of Austria. France long held the eagle in high esteem as a symbol, but it was abolished with the rise of the republic in 1870. The bald eagle is the emblem of the United States and is represented with outstretched wings, having the olive branch in one talon, a bunch of arrows in the other, and a shield upon its breast. Its head is surmounted by thirteen stars, while in its beak is a band bearing the inscription "E pluribus unum."

EAGLE, a gold coin current in the United States, equal in value to ten dollars. It was coined in 1795, weighing 270 grains and containing 247½ grains of pure gold. Later the government began to coin of the same fineness and of proportional value the double eagle, half eagle, and quarter eagle.

EAMES (āmz), **Emma,** soprano singer, born in Shanghai, China, Aug. 13, 1867. She descended from American parentage, her father being a lawyer in the international court of Shanghai, and spent her childhood in Boston, Mass., where she studied music. Later she received musical instruction in Paris, France, and made her début as *Juliette* at the Paris Grand Opera in 1889. Two years later she sang successfully in London and New York, and while in the former city married Julian Story, the portrait painter. Subsequently she appeared frequently in the larger cities of the world. Among her leading parts are the *Countess* in "Le Nozze di Figaro," *Colombe* in "Ascanio," and *Yasodhara* in "The Light of Asia." She studied and scored successes in the later rôles of Wagner in German.

EAR, the organ of hearing. It is divided into three parts: the external ear or concha, the middle ear or tympanum, and the internal ear or labyrinth. The *external ear* consists of a passage to the middle ear, is about an inch in length and a quarter of an inch in diameter,



EAR.

A, anvil; *B,* hammer; *C,* stirrup.

and is formed partly of flesh and partly of bone. Around its opening is a lobe, called the *auricle* or *pinna,* which serves to collect sound waves. Rudimentary muscles are connected with the external ear and are so well developed in some persons that they can move their ears as a rabbit or a horse does. The outer half of the passage is provided with a number of glands that secrete a kind of sticky wax, which prevents dust and insects from reaching the drum membrane. The gland secreting the wax grows outward towards the surface like the nails and prevents it from accumulating. Carelessness in picking the ear sometimes causes the wax to crowd against the drum membrane and results in partial or total deafness.

The *middle ear* is provided with a special mechanism for transmitting the air vibrations to the inner ear through two outer cavities. The tympanum or middle ear is connected by a small aperture with the inner ear. As to the size, the breadth of the middle ear is about a quarter of an inch and its length a half an

inch. It is lined with mucous membrane and filled with air. The drum membrane is a thin leaf which closes the outer end like a drum, and a similar membrane closes the aperture to the inner ear. The cavity of the middle ear is increased by extending backward into a bony projection, which can be felt behind the outer ear, and is called the *mastoid process.* From this a tube, called the *eustachian,* about the size of a knitting needle, passes to and connects with the pharynx, and is opened by the act of swallowing. A chain of three small bones, known as the *ossicles,* constitutes the essential part of the middle ear. These are called the *malleus* or *hammer,* the *incus* or *anvil,* and the *stapes* or *stirrup,* and extend across the cavity from one membrane to another.

When sound waves strike the ear drum, they are thrown into vibrations, which are transmitted to the inner ear by a chain of bones. The vibrations are increased by the tympanum and its extension into the mastoid cells, which act like the sounding box of a violin. The *internal ear* or *labyrinth* is the most delicate part. At its center it is about an eighth of an inch in diameter, this part being called the *vestibule.* A small spiral tunnel extends from the vestibule, which is called the *cochlea* from its resemblance to the inside of a snail's shell, and, besides it, there are three other tunnels called from their shape the *semicircular canals.* A clear liquid fills the labyrinth, which is lined with epithelial cells, and in them the nerves of hearing end. Cilia are numerous upon the surface of the epithelium, and among them are hard particles called the *ear sands.* When the sound waves reach the liquid, they produce waves that beat against the cilia, thus causing the sense of sound.

In order to produce a sound it is necessary that the waves in the liquid surrounding the nerves occur at least sixteen times a second. When they occur more than 38,000 times a second, no sound will be heard for the reason that they are too rapid for the nerves to take account of their action. The nerves of action may be excited by the air in the middle ear being too dense or too rare, by too much blood circulating in the middle ear, and by a blow upon the head or wax in the ear. Quinine and other drugs tend to produce abnormal excitement. In some cases an impression passes to the brain by the auditory nerve as though a real sound had excited the nerves. Other illusions are caused by an excitement of the pulse in an insane person. In dreams persons often get vivid impressions of sounds, and they are afterward recalled to memory and seem to be real.

Birds and quadrupeds have ears corresponding to those in man. No outer ear is found in turtles and frogs, but the drumhead forms a visible circle behind the eyes, just under the skin, and the middle ear contains a single bone. Snakes have no external or middle ear, but a bone extends from the inner ear to a kind of membrane immediately below the skin by which they are able to hear. The vibrations in fish are transmitted only through the skull, since they have no external or middle ear, and the labyrinth has no cochlea. Other animals have ears more or less modified, and those that have ears at all possess a modified form of the internal ear. See **Sound.**

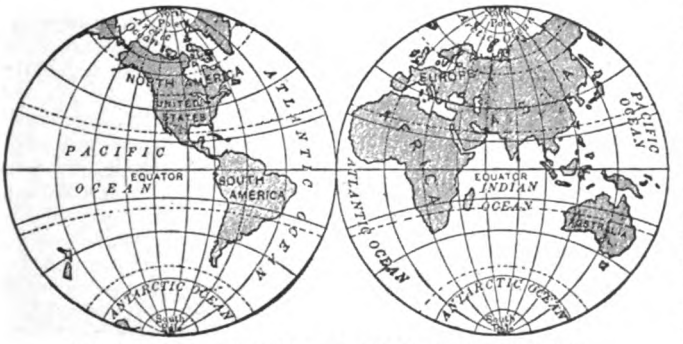
EARLY (ēr'lĭ), **Jubal Anderson,** general, born in Franklin County, Virginia, Nov. 3, 1816; died March 2, 1894. He graduated from West Point in 1837 and was appointed lieutenant of artillery, but resigned to study law. Subsequently he was elected to the Legislature of Virginia, but soon after enlisted for service in the Mexican War as major of a volunteer regiment. He served as colonel in the Confederate army at the beginning of the Civil War, and soon advanced to the rank of brigadier general. His service was distinguished at Fredericksburg and Gettysburg, but General Sheridan routed him at Cedar Creek and General Custer beat him at Waynesboro, after which he was relieved of his command. Subsequent to the war he traveled in Europe, and later resumed the practice of law at Richmond. He published "Memoirs of the Last Years of the War" and "Jackson's Campaign Against Pope."

EARRING (ēr'rĭng), an ornament suspended from the ear, the lower part of which is pierced for the purpose. Orientals have prized this mode of adorning the person from remote antiquity. Anciently earrings were worn by both sexes in many countries of Asia and Africa, especially in Persia, Egypt, Babylon, and Carthage. The fashion was confined to women in Greece and Rome, where the people looked upon this ornament as one especially fitted for those of rank. In the time of Queen Elizabeth it became fashionable to wear earrings by both sexes, and the custom still prevails to a considerable extent among men in some countries and among certain classes of laborers, especially sailors. However, earrings are worn chiefly in Europe at present, where the custom is quite general, but in America these ornaments are not used as extensively as in the past. Earrings are made chiefly of silver and gold, with settings of precious stones. All of the more valuable antique earrings are finely ornamented and contain settings of pearls. Many ornaments classed as earrings are not properly rings, but are attached to the ear with a hook, the size and value varying greatly according to changes in the fashion.

EARTH (ērth), one of the eight planets which revolve around the sun and from it receive light and heat. It is farther from the sun than Mercury and Venus, and is larger than Mercury, Venus, or Mars. A satellite, called *Moon,* revolves around it at an average distance, measured from the center of the moon, of about 239,000 miles.

FORM AND SIZE. Among ancient peoples the belief was current that the earth is an extensive flat surface surrounded by water, though many writers of antiquity suggested that its form is spherical, and some held the view that it revolves around the sun. Its spherical form is now admitted by the scholars of all civilized countries, and numerous proofs are submitted to establish that fact. The form is that of an oblate sphere, much like an orange, slightly flattened at two opposite sides and somewhat enlarged midway between. A diameter imagined drawn through the shorter distance is called the *axis,* the two ends of which are its *poles,* and a line drawn around it midway between the poles is the *Equator.* The length of the axis is 7,899 miles, and its equatorial diameter is 7,925.6 miles, or about 26.6 miles greater than the former. The *circumference* is 24,899 miles, and the entire surface is equal to about 197,000,000 square miles.

PROOFS OF ROTUNDITY. Among the proofs that the world is round is the fact that men have circumnavigated it. Magellan was the first navigator to pave the way for this enterprise, in 1519. Though he was killed in the Philippine Islands two years later, the voyage was completed successfully by Sebastian del Cano, one of his officers. Sir Francis Drake successfully completed a trip round the earth in 1580, and since then many others have done likewise. The rotundity is also proven by the shape of the *great circle of illumination,* the line separating the portion of the earth's surface which is in the shadow from the part which is lighted by the sun's rays. Besides these are the facts that the horizon has a circular shape, that the earth's shadow cast on the moon during an eclipse of the moon is circular, that the tops of ships are seen first when sailing towards us and last when passing away, that the horizon of vision becomes larger as we ascend in a balloon or to an eminence, and that new constellations of stars appear as we pass from the Equator to the poles. The actual measurement of the arc of a meridian has not only demonstrated the earth's rotundity, but has enabled us to know approximately the amount of its oblateness.



HEMISPHERES, SHOWING PARALLELS AND MERIDIANS.

SURFACE LINES. We imagine the earth to be encircled by a number of curved lines, for the purpose of being able to locate places on its surface and to represent certain localities on globes and maps. They are divided into *great* and *small* circles, the former dividing the earth into two equal parts or hemispheres, and the latter dividing it into unequal parts. The Equator is a great circle, and divides the earth into the Northern Hemisphere and the Southern Hemisphere. Meridian circles are great circles that pass through the poles, while parallels are small circles that pass round the earth parallel to the Equator. Latitude is measured north and south of the Equator along the meridians by the parallels, and longitude is measured on the parallels, by the meridians, east and west of a prime meridian. Both latitude and longitude are reckoned in degrees.

DENSITY. The density of the earth, that is, the quantity of matter it contains, is found by careful calculation to be 5,639 times that of water. This means that the real earth weighs 5,639 times as much as a sphere of water equal in size to the earth. The measurement of the earth's density was attempted about a century ago by calculating it from the attraction of a mountain on two plumb lines, one being suspended on each side. Since plumb lines suspended in this manner are attracted to the mountain mass, they indicate lines that converge toward the center of the earth, and by them geologists are able to compare the weight of the earth with that of the mountain, the latter having been first carefully examined and its weight calculated in tons. The mountain first utilized in making this important research is Schihallion in Scotland. Other methods include the test made by Cavendish, in which the attractive force of the earth was compared with that of two large balls over two other small balls by means of the torsion balance, that ascertained by the difference of oscillation of a pendulum when placed at the sea level and when at the top of a mountain, and the pendulum experiments at the top and bottom of a deep mine for determining the difference of gravity. There are other methods, but these are the principal ones and are regarded of greatest worth.

CREATION. It is thought that the earth originally existed in a nebular or gaseous state, and that its elements and those of other heavenly bodies were generally distributed throughout space. By the expulsive force of heat, the attraction of gravity was overcome, and the different portions collected about nebulae that formed the centers of the various bodies. In

this way the earth took on its present form, the action covering long periods of time, perhaps many millions of years, each period represented in Genesis as days. The mass gradually cooled by radiation, the outer surface and the polar regions cooling first and forming a crust; while the interior, cooling by conduction, still retains a high temperature. The spherical form attests its former fluidity, while the highly crystalline state of rocks formed early and the warm climate during the geological past give evidence of great central heat during remote ages. That the interior is still highly heated is evidenced by a rise of temperature equal to 1° Fahr. for every 55 feet of descent into the crust. If this general rise in temperature continues, it reaches the boiling point at a depth of two miles, and at fifty miles below the surface the heat is sufficient to melt every solid.

INTERIOR. As to the condition of the interior, various views have been expressed, among them that the earth has a solid crust and a solid center, with a heated pasty layer between; that the earth is solid throughout, but has a highly heated interior; and that the crust is solid, but the interior is a pasty mass in a highly heated condition. The last mentioned view is held most commonly and likely is correct, since the immense pressure at the center probably operates to raise greatly the melting point and tends to hold the mass in a pasty condition, even if the temperature is very high. The cooling effect of the heated interior causes the crust to contract or shrink, thereby crowding the materials into a smaller space, and exerting a marked influence on the crust. In some cases gases exert a marked pressure, rocks are melted, and frequently pressure is removed by certain portions of the earth's surface being elevated. In some cases water undoubtedly comes in contact with melted rocks by soaking down and is converted into steam. By this hypothesis it is possible to account largely for the phenomena of volcanic action, earthquakes, nonvolcanic igneous eruptions, and gradual elevations and subsidences of the crust.

MOTION. The earth has two motions, the *diurnal* and the *annual*. The diurnal motion is its daily motion from west to east around its own axis, which requires twenty-three hours, fifty-six minutes, four seconds—about twenty-four hours—and is the direct cause of our common day and night. By annual motion is meant the revolution of the earth around the sun, which is completed in about 365 days and six hours, and is one of the causes of our common year. The orbit is in the form of an ellipse, and has a total length of about 577,000,000 miles. Since the sun is at one focus of the ellipse, the earth is nearer the sun at some times in its revolution than at others. The earth is at perihelion about the 1st of January each year, when it is about 3,000,000 miles nearer the sun than at aphelion, six months later. Its distance from the sun at perihelion is 89,897,000 miles and at aphelion, 92,963,000. The average velocity at which the earth moves in its orbit through space is about nineteen miles per second, while the rotation on its axis causes any point on the Equator to move about 1,042 miles per hour. However, the velocity caused by its rotation diminishes toward the poles.

The earth's axis is inclined 23½° to the plane of the ecliptic and points nearly to Polaris, the north star. Owing to this it is always approximately parallel to any former position, and different portions of the surface receive the vertical rays of the sun. From this it is clear that new portions of the surface are turned toward the sun every day during the revolution, thus causing the change of seasons. The winter solstice occurs on December 21 and the summer solstice on June 21. On the former date the days are shortest north of the Equator, while on the latter date the reverse is true. The vernal equinox occurs on March 20 and the autumnal equinox on September 22, at which two periods in each year the days and nights are of equal length in all parts of the earth. At the poles the longest days and nights are each six months, being caused by the constant parallelism of the earth's axis in its revolution. The Arctic Circle bounds the north polar zone and the Antarctic the south polar zone, each being 23½° from the pole, that being the distance the sun shines beyond the pole during the respective solstices, and include respectively the North and South Frigid zones. The sun shines directly on every point twice in the year throughout a region extending 23½° both north and south of the Equator, which is called the Torrid Zone. The circle in the Northern Hemisphere which bounds this region is called the Tropic of Cancer and in the Southern Hemisphere the Tropic of Capricorn, both being called tropics. Between the polar circles and the tropics are respectively the North and South Temperate zones, each occupying 43°.

SURFACE PHENOMENA. About 150,060,000 square miles of the surface of the earth are water and 46,940,000 square miles are land. The water surface is divided into five great oceans and numerous bays, seas, gulfs, and channels. Lakes, rivers, and glaciers are classed as features of the land surface, though the waters of most of them flow into the oceans. Tides, currents, and waves are great phenomena of the oceans, while earthquakes, rains, and winds equally affect both the water and the land surfaces. The Eastern Hemisphere contains the greater portion of the land masses, including all of Europe, Asia, Africa, and Australia, while the Western Hemisphere includes America. The only great land masses south of the Equator are Australia and portions of South America and Africa. Besides the five continents, there are numerous detached masses called islands.

These are known as continental, when near the continent; oceanic, when far out in the oceans; volcanic, when of volcanic origin; and coral, when built largely by the coral polyps. The greatest depths of the ocean are equal to the heights of the loftiest mountains, about 29,000 feet, and usually are found near the greatest land elevations. Land masses have irregular coast lines and a surface variously designated as valleys, plains, deserts, plateaus, mountains, and depressions below the sea level. The three kingdoms studied in relation to the earth are those of the minerals, plants, and animals. According to the latest reports, the total population is 1,500,000,000. See **Atmosphere.**

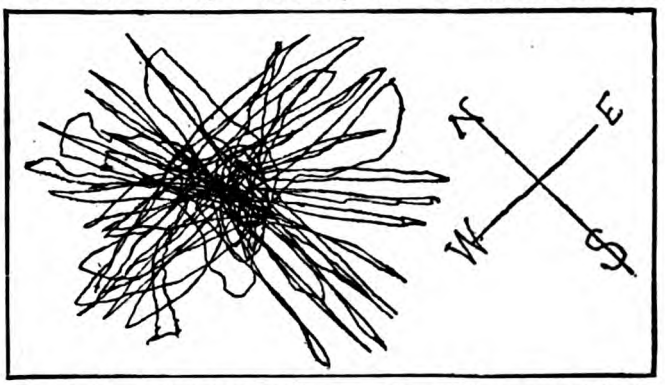
EARTH CURRENTS, the natural electrical disturbances which appear to be allied closely to the magnetic storms. They are associated with the magnetism of the earth. Though not well understood, they are known to be dependent upon or affected by the occurrence of spots on the sun and by the appearance both of aurora borealis and aurora australis. Communication by long lines of telephone or telegraph, and especially submarine connections, is affected constantly by earth currents.

EARTHENWARE, any object made of clay and dried in the sun or baked in a kiln, though the term is sometimes restricted to the inferior grades of earthenware as distinguished from stoneware and porcelain. See **Pottery.**

EARTHNUT, the name of the tubers of certain plants of the parsley family and a number of others, so called because they grow and mature in the ground. Pignut and earth chestnut are other names of plants of this kind. A species common to Sweden produces tubers which are valued for their nutriment and these form an important article of trade. Another species is common to Greece. Most of these tubers are about the size of a chestnut, have a brownish color and sweetish taste, and grow on slender roots from four to six inches below the surface. When used as an article of food, they are roasted or cooked in soups. Earthnuts are prized as feed for swine and are fed in some localities for fattening purposes.

EARTHQUAKE, a sudden undulation of a portion of the earth's surface produced by forces acting from beneath. Several theories have been advanced as to the probable cause of the disturbances, and, while any great concussion upon the surface of the earth may cause a diminutive earthquake, steam is clearly the most favorable agent, as its sudden generation or condensation on a large scale is sufficiently powerful to produce extensive movements in the earth's crust. Water probably finds its way through fissures in the earth's crust to heated rocks, where it is suddenly converted into steam. Some earthquakes are caused by the falling in of the roof of enormous subterranean caves formed by the solvent action of water on deposits of rock salt, limestone, or gypsum; by various gases that result from internal heat; and by the general contraction of the earth's crust, resulting from the radiation or conduction of heat. Earthquakes are classified according to the character of the movements, which may be *vertical, circular,* or *wavelike.* The circular or twisting movements are rare, but they are the most destructive.

There is little doubt that the cause of earthquake and volcanic action is the same, though the latter is governed materially by permanent channels through which the discharge is made. Certain premonitory symptoms usually herald the approach of a great earthquake, such as subterranean noises like cars running over a bridge. Suddenly the fatal moment arrives,



Record of the earthquake at San Francisco, Cal., in 1906, as recorded by the seismograph.

some portion of the surface becomes the center of impulse, and waves are propagated in all directions through the solid materials of the earth's crust. If the center of impulse is below the sea, as it often is, the vibrations of the ground are accompanied by inundations of water. The earth frequently heaves and swells like a rolling sea, fissures being produced in all directions similar to those on a broken window-pane, various noises accompanying the vibrations. These disturbances may consist of a single shock, lasting a few seconds, or a series of such shocks continuing for days or weeks. The principal shock at San Francisco, in 1906, had a duration of twenty-eight seconds. It was wavelike and the earth moved about two inches east and west and three inches north and south. Great changes in the surface of the earth have been made in a few seconds of time, as in the earthquake of Italy in 1908, and many towns and many thousands of lives have been lost. It is estimated that an earthquake occurs somewhere every day, though most of

them are barely perceptible. They are more numerous in winter than in summer and at night than during the day, for the reason that the cooling of the earth's crust is more rapid. They are more frequent when the attractive forces of the sun and moon act simultaneously, which occurs during full and new moons.

Some of the most destructive earthquakes on record are: 742 A. D., Asia, 500 towns destroyed; 1531, Lisbon, Portugal, 1,500 houses and 30,000 persons destroyed; 1693, Sicily, 54 towns, 300 villages and more than 100,000 lives lost; 1731, Pekin, China, 100,000 persons killed; 1754, Cairo, Egypt, 400,000 lives lost; 1755, Lisbon, Portugal, 50,000 persons killed. The most severe earthquakes ever known in the United States occurred at Charleston, S. C., in 1886, and at San Francisco, Cal., and its immediate vicinity on April 18, 1906. At the time of the latter a large part of San Francisco, many buildings of



MAP OF THE REGION DISTURBED BY THE EARTHQUAKE OF 1908.

the Leland Stanford Junior University, and much property in adjacent towns were destroyed. In the same year, on August 16, a destructive earthquake visited Valparaiso and other cities of Chile.

The most destructive earthquake of recent times visited Calabria and Sicily in December, 1908, when Messina and Reggio were almost totally destroyed. Suddenly and without warning, at 5:20 o'clock in the morning, the earth began to tremble. At Messina, after the city crumbled into ruin, a wave of water 35 feet high engulfed the streets at the water front. As the wave receded its surface was black with human corpses and the wreckage of houses. At Reggio a chasm eighty feet wide opened and belched out scalding water. The disturbance extended from the vicinity of Naples to some distance south of Catania, but it was centered largely in the Strait of Messina, between Messina and Reggio, whose shores were greatly changed by the upheavals and subsidences. The loss of human life is estimated at about 200,000.

EARTHS, in chemistry, a class of substances consisting of a metal combined with oxygen, erroneously regarded elementary by alchemists and early chemists. They are insoluble, inodorous, and tasteless, and constitute the larger part of the soil and gravel. Lavoisier classed them as compounds and they are so recognized in modern chemistry. The list includes baryta, lime, strontia, and magnesia, which are classed as alkaline earths, since they are less soluble in water than true alkalies. Thoria, zirconia, alumina, didymia, glucina, erbia, ceria, yttria, and lanthana are true earths.

EARTH SHINE, the faint light seen on the part of the moon not illuminated by the sun, but which is cast upon her by the earth. Sometimes the outlines of the full moon are made visible by the reflection, which occurs on clear nights at the time the moon is very old or very new.

EARTHWORM, or **Angleworm,** the common name of many species of worms found widely distributed in the tropical and temperate regions. They are called earthworms because they burrow in the earth, but are known in some sections as angleworms or fishworms, since they are used as bait in angling. After a hard rain they are seen on the surface, when they are said to have *rained down,* but their coming out of the ground is due to the fact that they crawl about in attempting to get away from the water. The body is formed of many narrow rings in contact with each other, and is covered with rows of bristles pointing backward. It has no tentacles, eyes, ears, or teeth. The upper lip is extended, forming a kind of proboscis. Those commonly seen in the Temperate zones are three or four inches long, though some, when fully extended, are nearly a foot in length. They swallow the decaying parts of animals and vegetables and take with them into the ground a quantity of soil, which is subsequently ejected in small heaps called *worm casts.* It is estimated that on an acre ten tons of earth is thus improved and enriched

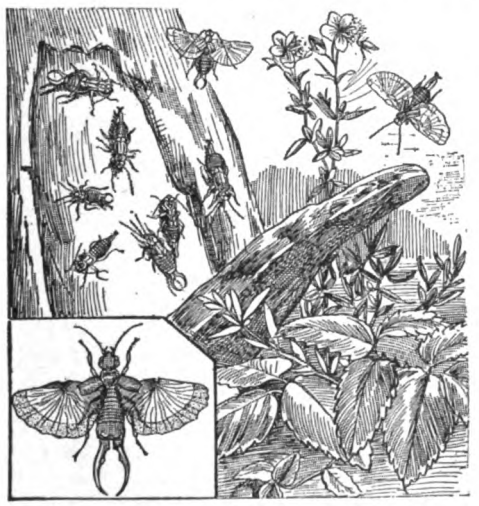


EARTHWORM.

every year. The passages they burrow in passing through the soil loosen and stir it, making room for roots to grow more easily, and for the elements of the air to destroy the poisonous alkalies. Charles Darwin expressed the view that vegetable soil in its present aspect and distribution was produced largely by earthworms. Besides their usefulness in the improvement of the soil, they are important as food for birds, fishes, and insects.

EAR TRUMPET, an instrument used by those who have defective hearing or are partially deaf. Many forms of this contrivance are in general use, but they agree in having a trumpet-shaped tube to collect and condense the sound waves, and thus intensify the impression upon the ear. The ear trumpet is held by the hand in the direction where the sound originates, while the other end of the tube is placed in the cavity of the ear. It is not necessary to have an expensive adjustment of the parts, since sound is readily reflected along conical tubes, whether they are straight or coiled. Small ear trumpets, called cornets, are attached to the ear by a spring, hence are concealed by the hair of the wearer, but these can be used to an advantage only where the hearing is very slightly impaired.

EARWIG (ēr'wig), a genus of insects allied to the cockroach and classed with the runners. They have six feet well formed for running; two pairs of wings, an upper short pair and a lower gauzelike pair; a mouth formed for mastication; and a somewhat flattened body. The



Earwigs, showing larvae and perfect insects.

abdomen has strong pinchers and the head is provided with delicate antennae. The earwig is so named from the erroneous belief that it creeps into the ears of sleepers. Several species are widely distributed in Europe. In North America these insects are found only on the Pacific Coast and in the central and southern parts of the continent. Several small centipedes which frequent houses in the United States are known as earwigs.

EASEMENT, in law, the right which one person has in the real estate of another, not inconsistent with the general property of the owner, such as a right of way over it or a right to lay pipes below the surface. It is distinguished from a mere license, since an easement is a permanent right. An easement is called a *dominant right,* while the land burdened is termed the *servient estate.* It is acquired either by *grant* or by *prescription.* The former is usually by a formal written deed, but an oral grant is sufficient when the possession passes to the grantee.

EAST AURORA (ạ-rō'rà), a village of New York, in Erie County, seventeen miles southeast of Buffalo, on the Western New York and Pennsylvania Railroad. It is surrounded by a fertile farming country, and contains the residences of many Buffalo business men. Among the facilities are electric lights, public waterworks, and a number of fine school buildings. Aurora is noted as the seat of the Roycrofts, a printshop which produces fine editions of standard and current books and handmade furniture. Population, 1910, 2,781.

EASTBOURNE (ēst'bûrn), a seaside resort of England, in Sussexshire, on the coast between Brighton and Hastings. It has railroad facilities, electric lights, finely paved streets, and a commodious town hall. Along the shore is a fine drive two miles long. It has gained rapidly in population on account of its healthful situation and popularity as a coast resort. The town was incorporated in 1883. Population, 1911, 52,544.

EAST CAPE, the most easterly cape of Asia, extending into Bering Strait, nearly opposite Cape Prince of Wales, the most westerly point of North America. It is a rocky promontory and is almost cut off from the mainland by shallow lakes and swamps. The village of Uedle is situated on the northeastern side, containing a population of 300. The name Cape East is also applied to the southeastern extremity of New Guinea; the eastern headlands of North Island, New Zealand; and the easternmost point of the island of Madagascar.

EAST CHICAGO, a city of Lake County, Indiana, 20 miles south of Chicago, on the Wabash, the Pennsylvania, and other railways. It is important as an industrial center, having extensive manufactures of iron and steel locomotives, railway cars, ironware, and machinery. The chief buildings include the city hall, high school, Carnegie library, and many churches. It has street railways. Population, 1910, 19,098.

EASTER (ēs'tẽr), the festival kept in commemoration of the resurrection of Christ. It was observed by the early Christians as a continuation of the feast of the passover and generally lasted eight days, from Palm Sunday to Easter Sunday inclusive. It was a time of joy. The austerities of Lent were over; alms were given to the poor and needy; sports, dances, and farcical exhibitions were indulged; and stories and legends were recited by the clergy to stir the hearts of the hearers to laughter. On Easter day the people saluted each other with a kiss and the exclamation, "He is risen;" to this the reply was, "He is risen, indeed." A long controversy took place between

the Eastern and Western churches as to the proper time for celebrating Easter, but in 325 it was fixed by the Council of Nice on the first Sunday after the full moon occurring upon or next after March 21. Easter, the feast of eggs, is considered emblematical of the resurrection and of a future life.

EASTERN QUESTION, the problem which relates to Turkey in Europe and the occupation of the Balkan Peninsula. It has been a complicated issue of international politics for many years, but its modern phase dates from 1856, when the Congress of Paris made definite declarations upon the questions involved in the Crimean War. The war between Russia and Turkey in 1877 opened the problem anew, after which the Congress of Berlin refused to permit the former country to receive the full benefits arising from the new status created by the conflict. It was likewise influenced by the annexation of Eastern Rumelia to Bulgaria in 1885, the war between Greece and Turkey in 1897, and the establishment of autonomy in Crete. The question was again opened in 1908, when Bulgaria declared its independence and Austria-Hungary proclaimed the annexation of Bosnia and Herzegovina. It is not probable that the issues will be finally adjusted until the territory of Turkey in Europe becomes absorbed by the nations of Europe, when the status existing at the time of the ancient Byzantine Empire will be restored in a measure and the Turks will be confined beyond the Hellespont.

EASTERN RUMELIA. See **Rumelia.**

EASTHAMPTON (ēst-hămp'tŭn), a town of Massachusetts, in Hampshire County, four miles southwest of Northampton. It is on the Boston and Maine and the New York, New Haven and Hartford railroads, and has a growing trade in merchandise and produce. The manufactures include yarn, rubber goods, cotton textiles, buttons, and machinery. It is the seat of Williston Seminary, a preparatory school for boys, and has a fine public library. Waterworks, electric lights, and several fine schools are among the public improvements. The settlement of Easthampton dates from 1665, and it was organized as a town in 1809. Population, 1905, 6,808; in 1910, 8,524.

EAST HARTFORD a town of Connecticut, in Hartford County, a short distance east of Hartford, on the New York, New Haven and Hartford Railroad. It has railroad shops and manufactures of paper, tobacco, clothing, and machinery. The noteworthy buildings include a town library, the Raymond Library, and the high school. It has public waterworks and electric lighting. The first settlement on its site was made about 1645. Population, 1910, 8,138

EAST INDIA COMPANIES, the term used to designate companies organized in the 17th and 18th centuries for the planting of colonies and the promotion of trade. They were organized under the governments of Holland, Great Britain, Sweden, and Denmark, and were given a monopoly of foreign and colonial trade within certain districts. The company operating in a specified region was granted exclusive control in the matter of government and was permitted to organize armed forces, equip natives, and build defenses for the general good. Some of the companies paid an annual tax to the home government and in return received aid and protection. After a time difficulties arose regarding territorial claims, which resulted in several wars between some countries of Europe. The first English company was granted a charter by Queen Elizabeth in 1600 for the purpose of securing East Indian trade. It was chartered as "The Governor and Company of London Merchants Trading with the East Indies." It became the most powerful body in its time, represented a large capital, and was controlled by a court of proprietors, who were large shareholders in the company. Parliament appointed a government board of control in 1784, and in 1858 made India a crown province, when the company ceased active existence, though for several years afterward it maintained an organization for the purpose of closing up its business.

In 1602 the Dutch company was organized and vied with the British until 1795 for the supremacy of the East Indian seas. The Danish company was founded in 1618 and had a varied existence until 1729, when its property interests were transferred to the state. In 1664 the first French company was founded. It continued operations until 1769, when its business interests were merged into the government. The Swedish company organized for the Indian trade in 1741, and reorganized on a government basis in 1806. Both the Danish and French made their chief seat of operations on the Coromandel Coast, while the Dutch operated in Sumatra, Java, and adjacent islands, and their possessions in the Dutch East Indies date from the operation of their company. The British company settled largely in India proper, at Calcutta, in Bombay, Bengal, and Madras.

EAST INDIES (ĭn'dĭz), the name applied to the region which includes the two great peninsulas of Southern Asia and the islands located from the delta of the Indus to the northern extremity of the Philippines. The appellation is made usually to distinguish these islands from the West Indies, and quite frequently includes all the islands southeast of Asia, except the Philippines and New Guinea.

EASTLAKE (ēst'lāk), **Sir Charles Locke,** historical painter, born in Plymouth, England, Nov. 17, 1793; died in Pisa, Italy, Dec. 23, 1865. He first attended the Charterhouse School, London, and later studied at the Royal Academy and in Paris. He was compelled to leave France at the time Napoleon returned from Elba, after which he resided for a time in his

native town and later at Rome, where he produced several paintings which attracted much favorable mention. In 1800 he was knighted and about the same time became president of the Royal Academy. His death occurred while making an extended journey in search of specimens for the national gallery. His best known paintings include "Christ Weeping over Jerusalem," "Hagar and Ishmael," and "Beatrice." Eastlake attained a high reputation as a writer on art. Among his productions are "Penny Cyclopaedia," "Materials for the History of Oil Paintings," and a translation of Goethe's "Farbenlähre." His wife, Lady Elizabeth Eastlake (1809-1893), distinguished herself as an authoress by contributions to the *Quarterly Review.* Her "Letters from the Baltic" and "Livonian Tales" were generally read.

EAST LIVERPOOL (lĭv'ĕr-pōōl), a city of Ohio, in Columbiana County, on the Ohio River. It is on the Cleveland and Pittsburg Railroad and is surrounded by a fertile country. The noteworthy buildings include the public library, the high school, the city hall, and several fine churches. Many of the streets are substantially paved, lighted by gas and electricity, and traversed by electric street railways. The manufactures embrace furniture, cigars, machinery, ironware, and farming implements. It has large pottery interests and extensive machine shops. The place was settled in 1795 and incorporated in 1834. Population, 1910, 20,387.

EASTMAN, Elaine Goodale, poetess, born in Mount Washington, Mass., Oct. 9, 1863. In connection with her sister, Dora Reed Goodale, she published "Verses from Sky Farm," "Apple Blossoms," "In Berkshire with the Wild Flowers," and "Verses of Two Children." She became a teacher of the Indians at the Hampton Indian Institute, and subsequently at the White River Camp school, in South Dakota. In 1891 she married Dr. C. A. Eastman, a full-blooded Sioux Indian. Her chief work is "Journal of a Farmer's Daughter."

EASTON (ēst'ŭn), a city of Pennsylvania, county seat of Northampton County, 52 miles north of Philadelphia. It is at the junction of the Delaware and Lehigh rivers and on the Pennsylvania, the Lackawanna, the Central of New Jersey, and other railroads. Extensive slate quarries and coal and iron fields are worked in the vicinity. Bridges connect it with South Easton and with Philipsburg in New Jersey. The noteworthy buildings include the public library, the county courthouse, and the high school. It is the seat of Lafayette College, a Presbyterian institution established in 1832.

Easton is an industrial center and a shipping point for coal and produce. The manufactures include machinery, wire, clothing, hardware, cordage, musical instruments, and food products. It has street railways, gas and electric lighting, waterworks, and pavements of stone and macadam. The place was laid out in 1750 and incorporated in 1789. Important treaties with the Iroquois were made here in 1756 and 1761. Population, 1900, 25,238; in 1910, 28,523.

EAST ORANGE, a city adjacent to Newark, N. J., twelve miles west of New York City, on the Lackawanna and the Erie railroads. Many business men of New York have handsome villas and make it their residence. The chief buildings include the public library, the town hall, and many schools and churches. It has electric lighting, well-paved streets, systems of sewerage and waterworks, and electric railways. It was a part of Orange until 1863 and was incorporated as a city in 1890. Population, 1905, 25,175; in 1910, 34,371.

EASTPORT, a city and port of entry in Maine, in Washington County, the easternmost settlement of the United States. It is located on Moose Island, in Passamaquoddy Bay, and has a deep harbor. The chief industries are fishing, shipbuilding, and sardine canning. Among the principal buildings are the public library, a customhouse, and several schools. The first settlement was made at Eastport in 1782, but it was claimed by England and captured in 1814. The British governed it under martial law until June 30, 1818. Population, 1900, 5,311; in 1910, 4,961.

EAST PROVIDENCE, a town of Rhode Island, in Providence County, across the Seekonk River from the city of Providence, on the New York, New Haven and Hartford Railroad. It is important as a manufacturing and commercial center. The chief manufactures include chemicals, fencing wire, handkerchiefs, clothing, and machinery. It was formerly a part of the town of Rehoboth together with Seekonk, Mass., but was set off from the former when the boundary line between Rhode Island and Massachusetts was definitely fixed. It was incorporated in 1862. Population, 1905, 13,750; in 1910, 15,808.

EAST RIVER, the name applied to the strait between Long Island Sound and New York Bay. It is twenty miles long and separates the boroughs of Brooklyn and Queens on the southeast from those of the Bronx and Manhattan on the west and north. Blackwell's, Riker's, and Randall's are among the islands within the strait. It is spanned by the Brooklyn, the Williamsburg, and other great bridges. At the center of its course the Hellgate rock formerly obstructed the passage, but it has been removed by blasting. The strait is not properly a river. The misnomer probably arose from the powerful action of the tides, which resemble the current of a river.

EAST SAINT LOUIS, a city of Saint Clair County, Illinois, on the Mississippi River, opposite Saint Louis, Mo., with which it is connected by the famous Eads's Bridge. About twenty railroads enter the city, including the Illinois Central, the Wabash, the Baltimore and Ohio, the Chicago and Alton, and other lines. Among

the noteworthy buildings are the public library, the city hall, the Howe Literary Institute, a Roman Catholic academy, and the public high school. Among the industries are rolling mills, car shops, gas works, foundries, nail factories, breweries, machine shops, flouring mills, and glass works. It has one of the largest stock-yards in the United States and has extensive interests in beef and pork packing. The streets are well paved, drained, and lighted. It was incorporated as a town in 1861 and as a city in 1865. A tornado swept over the city in 1896, killing about 500 people and destroying property valued at $10,000,000. Population, 1910, 58,547.

EATON (ē'tŭn), **Dorman Bridgman,** lawyer and civil service commissioner, born in Hardwick, Vt., June 22, 1823; died Dec. 23, 1899. He graduated from the University of Vermont and the Harvard Law School, after which he was admitted to the bar of New York, forming a law partnership with the late George Kent. After traveling abroad for some time in pursuit of information in civil service, President Grant appointed him a member of the first national civil service commission. He again visited Europe in 1877 at the request of President Hayes, and made a report to Congress regarding civil service in several countries. His influence as a civil service reformer was highly effectual in the administrations of Presidents Arthur and Cleveland. He drafted a law establishing the police courts of New York City in 1866, and in 1875 prepared a code of laws for the District of Columbia. By his will a fund of $100,000 was given to Harvard and Columbia universities. Among his publications are "Civil Service in Great Britain," "Independent Movement in New York," and numerous magazine articles.

EATON, John, educator, born in Sutton, N. H., Dec. 5, 1829. In 1854 he graduated at Dartmouth College, after which he studied in Andover Theological Seminary, and in 1861 was made chaplain in the Federal army. He was appointed superintendent of contrabands in 1862, and before the close of the war was brevetted brigadier general of volunteers. Subsequently he was a commissioner of the Freedman's Bureau, edited the *Memphis Post* in 1866-67, and the latter year was elected State superintendent of schools in Tennessee. He became commissioner of education of the United States in 1871, serving efficiently until 1886, in which year he was chosen president of Marietta College, Ohio. This position he held until 1891, and in 1895 was chosen president of Sheldon Jackson College of Salt Lake City. He was appointed inspector of education for Porto Rico in 1898. Among his publications are a number of excellent addresses and pamphlets relating to education. His books include "The Mormons of To-day," "The Freedmen in War," and "The History of Thetford Academy."

EATON, Margaret O'Neill, best known as Peggy O'Neill, the wife of J. H. Eaton, born in 1796; died in Washington, D. C., Nov. 8, 1879. She was the daughter of William O'Neill, an Irish hotel keeper of Washington, and after the death of her first husband, John B. Timberlake, she married J. H. Eaton, Secretary of War under President Jackson. When her husband was appointed to a position in the Cabinet, she attained to a social position that she had long desired, but reports of her questionable conduct in her previous life caused the other members of the Cabinet to refuse to recognize her on equal terms with their families. This caused an extended feud in the society of Washington and President Jackson reorganized his Cabinet to overcome disagreeable opposition. This circumstance caused Jackson and Van Buren to become very warm personal friends, but the friendship between Calhoun and the President was alienated, and through it Van Buren received the Democratic nomination for President in 1836, which would otherwise likely have been given to Calhoun.

EAU CLAIRE (ō klâr'), a city of Wisconsin, county seat of Eau Claire County, on the Chippewa River, at the mouth of the Eau Claire River. It has the advantage of steamboat navigation on the Chippewa, and is on the Wisconsin Central, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads. The site of the city is divided into three parts by the two rivers, which are crossed by several bridges. It is the center of an extensive market in lumber and produce. The chief buildings include the county courthouse, the high school, the public library, and the Federal building. It is the seat of several institutions, including the Sacred Heart Hospital Among the manufactures are flour, machinery, paper, hardware, lumber, and woolen goods. Gas and electric lighting, pavements, sewerage, and waterworks are among the improvements. An abundance of water power for manufacturing is obtained from both rivers. Population, 1905, 18,737; in 1910, 18,310.

EBERS (ā'bērs), **Georg Moritz,** eminent Egyptologist and writer, born in Berlin, Germany, March 1, 1837; died Aug. 7, 1898. After graduating at Göttingen and Berlin, he taught at Jena, and in 1868 became professor of Egyptology at Leipzig. By making several journeys through various parts of Asia and Africa, he added much of value to the fund of knowledge in archaeology and philology.



GEORG M. EBERS.

In 1873 he discovered a scroll dating from the 2d century B. C., near Thebes, now called the *Papyrus Ebers*. It is preserved in the University of Leipzig. Though a profound student of Egyptian history and classics, he is best known by numerous novels. His productions show a vivid imagination, strong emotional power, and marked touches of unmistakable genius. Among his best known writings are "Egypt and the Books of Moses," "Through Goshen to Sinai," "In the Blue Pike," "Story of My Life," "Cleopatra," "The Coptic Art," "The Sisters," and "An Egyptian Princess."

EBNER-ESCHENBACH (āb'nĕr-ĕsh'enbäg), **Marie,** novelist and poet, born at Castle Zdislawitz, Austria, in 1830. She was a countess by birth and married an Austrian officer. At an early age she secured a careful training, and began to write poetry and dramas as early as 1850. Some of her works have been translated extensively, and are popular owing to their polish and agreeable style of composition. Her writings included "Without Faith," "Lotti, the Watch Maker," "The Harmful," "Village and Castle Histories," "Bertram Wogelweid," and "The Old School."

EBONY (ĕb'ŭn-ĭ), a hard, heavy wood, usually dark, susceptible of a high polish, and used in many kinds of ornamental cabinet work. In various species of trees the heartwood becomes black and is the ebony of commerce. The Ceylon ebony is, perhaps, the best known, although the West India or Jamaica ebony of the bean family, a greenish-brown product, and the green ebony of the spurge family are of importance commercially. On account of jet black ebony being free from veins, it is considered the best. The different species are variously used for toys, mosaics, veneering, and inlaid work.

ÉCARTÉ (ā-kär-tā'), a game of cards which is popular in France, played ordinarily by two persons, but *pool écarté* may be played by three or more. In the latter the third player and others in the game act as advisers, remaining close at hand and advising one of the players, and, when one player loses a game, his place is taken by the adviser. The object is for the player to get all the tricks, but it is necessary for him to follow suit, if possible, and at other times he may trump. The game is interesting and is governed by elaborate rules.

ECBATANA (ĕk-băt'a-nà), an ancient capital of Media, founded about 728 B. C. It was inclosed by seven concentric walls, the innermost of which was gilded and the next was plated with silver, while the others were painted in order orange, blue, scarlet, black, and white, respectively. They rose in graduation toward the center, hence could all be seen at once by a spectator occupying an advantageous point. On a conical hill stood the beautiful temple of the sun. The city was about thirty miles in circumference during its prosperity. It was captured by Cyrus in 549 B. C. and later by Darius, who found there the edict of Cyrus the Great concerning the rebuilding of the temple of Jerusalem. Alexander the Great conquered it while on his famous Asiatic expedition. On account of its beautiful surroundings and mild climate it was made the summer residence of first the Median, second the Persian, and lastly the Parthian monarchs. It was pillaged by the Seleucidae and later by Antiochus the Great, and fell into utter decay, so that its exact site can no longer be fixed with certainty, though historians generally agree that the present Hamadan, containing the supposed tombs of Mordecai and Esther, occupies its ancient site.

ECCENTRIC (ĕk-sĕn'trĭk), a contrivance in mechanics for securing reciprocating rectilinear motion from a revolving shaft. It consists of a disc fixed on the axis or center of a wheel, which does not pass through the center of the other disc. Not being in the center, the result of its revolution is the same as a crank. It is used chiefly in machinery where a subsidiary motion of small power is required, as in operating the slide valves of steam engines and in working the force pumps of steam boilers.

ECCLESIA (ĕk-klē'zĭ-à), a popular assembly of the people, especially of Athens, to discuss public affairs. According to the laws of Solon these assemblages were held four times every 35 days, unless special meetings were called, when messengers were sent to summon the people from the country. Every citizen twenty years of age could vote and was required to attend under penalty of a fine. The poorer classes were paid a small sum for attendance. The meeting usually began by prayer to the gods, after which the business was introduced. Any regularly convened assembly came to be called *ecclesia,* and the name was afterward applied to the Church by the New Testament writers.

ECCLESIASTES, one of the canonical books of the Old Testament, commonly called the *Preacher* in the English versions. In the Hebrew it is called *Koheleth,* meaning the gatherer of the people. It is generally ascribed to the authorship of Solomon, but modern criticism places it at a much later date. The vanity of earthly good and the certainty of judgment are the two leading ideas of the Preacher. Some writers have imputed an epicurean meaning to several passages, but others regard them as mere ironical expressions.

ECCLESIASTICUS (ĕk-klē-zĭ-ăs'tĭ-kŭs), a book of the Apocrypha, commonly called the *Wisdom of Jesus the Son of Sirach.* The Jews and Protestants accept it as an apocryphal writing, but the Roman and Greek churches class it as canonical. It is recommended to be read for edification by the Articles of the Anglican Church. This book appears to have been written in Hebrew at Jerusalem about 250 B. C. It contains rules rather than principles for living, admonishes man to honor the law, and approves

of the righteous life for the happiness that it brings.

ECHIDNA (ĕ-kĭd'nȧ), a genus of toothless mammals native to Australia. These animals have a long, slender muzzle, toothless jaws, long, thick fur intermingled with sharp spines, and feet provided with powerful claws. When frightened or in danger, they curl up like the hedgehog to protect the under parts, which have no spines. They are closely allied to the duck-bill and, like it, propagate by eggs. The food consists chiefly of ants and other insects, for which they burrow in the earth. The body is from a foot to eighteen inches long and somewhat broad and depressed, and the movement is quite rapid, considering the shortness of the legs. They lie dormant during the seasons of drought and come out most frequently at night. Their flesh is prized as food by the Papuans and other natives.

ECHINODERMATA (ĕ-kī-nō-dēr'mȧ-tȧ), one of the grand divisions into which the animal kingdom is divided. It constitutes an independent assemblage of organisms, formerly classed as radiates with the Coelenterates, and ranks as the third from the lowest of the divisions of the animal kingdom. The five parts of their body radiate from a central axis, hence the former classification, and their external skeleton is calcareous, which is leathery in some species and in others is covered with spines. The alimentary canal is distinct from the body cavity and is protected by the skeleton, and the nervous system is radiate. Reproduction is by eggs. The young are greatly different from the adult, especially in that they are bilaterally symmetrical, instead of having the radiate structure.

Some species of the Echinodermata effect locomotion by a peculiar water vascular system, by which the water is carried to a system of locomotor tube feet, or *ambulacra,* these being thrust outward and forward to produce movement. In some of the larvae movement is effected by long arms, which are stiffened by slender rods of carbonate of lime. These arms are absorbed at the time metamorphosis takes place. The sense of touch is well developed, but only traces of pigment eyes and of the blood system are found in some of the species, while in others they appear to be entirely absent. All the species, of which there are about 3,000 now living, are marine and are distributed through all seasons. Seven divisions have been made of the echinodermata, depending upon the form of the body. They include the sea cucumbers, sea urchins, brittle stars, starfishes, cystoids, and pentremites. See **Starfish; Urchin.**

ECHO (ĕk'ō), in Greek mythology, one of the Oreades or mountain nymphs, daughter of the earth and air. It is related that Echo fell in love with Narcissus, who was deaf to her entreaties. In her grief she wasted away until nothing remained but her bones and her voice. Later she was avenged by Nemesis, who inspired Narcissus with a love for himself. Many poets have used the story as a basis for exquisite productions.

ECHO, a Greek word meaning sound, signifying the repetition of a sound wave, in the air, reflected from some obstacle. When the reflecting surface is at right angles, the sound waves are returned to the person or object causing them, but, if oblique, the echo is sent in another direction and may be perceived in some other locality than the one from which the waves were induced. No absolute law can be laid down for the exact distance the reflecting object must be from the speaker. Sound at 60° Fahr. has a velocity of 1,120 feet per second. If in ordinary speech five syllables are uttered in a second, then the speaker, standing in front of a reflecting surface 112 feet distant, can hear the last syllable. The other syllables are reflected, but reach the speaker just as he begins the next syllable, hence he does not hear them as distinct sounds. A sharp, quick sound may be heard 56 feet distant. In a properly constructed hall the voice of the speaker is strengthened in effect by the waves reflected by the walls and ceiling. If the walls are too close or too far the sound is confusing. Natural echoes are produced by woods, hills, rocks, and mountains, and many localities have become famous on account of them. Some echoes are repeated a number of times. It is said that the report of a pistol is repeated sixty times by an echo in the Simonetta Palace, near Milan, Italy. Lake Killarney, in Ireland, is noted for its echo, which belongs to this class.

ECK, Johann Maier von, celebrated theologian, born in Swabia, Germany, Nov. 13, 1486; died Feb. 10, 1543. At the early age of eleven years he entered the University of Heidelberg, and later took a course at Tübingen, where he obtained a degree in his fourteenth year. He studied jurisprudence and mathematics in Freiburg and in 1506 published a work on logic. In 1518 he privately circulated his "Obelisci" against Luther's thesis on the mass. Carlstadt answered the insinuations of Eck in 400 distinct theses, declaring his readiness to meet him in public disputation. The challenge was accepted and the general impression was that victory rested with Eck, after a three weeks' discussion with both Carlstadt and Luther, but temporary success only embittered his animosity against his opponents, and he used his whole ingenuity to overthrow Luther. He named his opponents Lutherans. In 1520 he returned from Rome with the papal bull of condemnation, but met with such an unfavorable reception by the people of Leipzig that he sought refuge in the Saint Paul convent. He took a leading part in the Augsburg Diet in 1530, the conference at Worms in 1540, and that at Ratisbon in 1541, laboring in vain to unite the divided church.

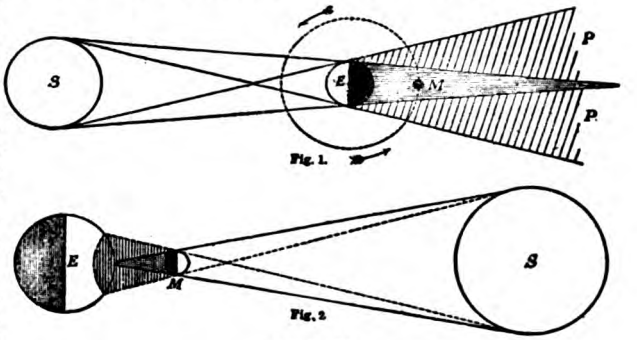
ECKFORD (ĕk'fērd), **Henry,** naval archi-

tect, born in Irvine, Scotland, March 12, 1775; died Nov. 12, 1832. He came to Canada at an early age and worked in the shipyards of his uncle, John Black, at Quebec, but removed to New York in 1796, where he established a shipyard of his own. In 1812 he received a large order from the United States to construct vessels of war for the lakes and inland waters, and during the war with England completed many ships and boats for the government. He built the steamer *Robert Fulton,* which was purchased by Brazil, and in 1820 took charge of the navy yard at Brooklyn, where he superintended the construction of six ships of war. In 1831 he went to Constantinople with a frigate constructed for Turkey, and engaged as naval constructor for the government of that country, but died before the work became established.

ECLECTICS, a class of philosophers who selected or chose from others what they considered the best parts of all the recognized systems. As a school of philosophy eclecticism necessarily had its rise after other systems had been established, since it chose what was regarded the best and harmonized it into a new system. Since both Plato and Aristotle drew from the philosophies of those who preceded them, they may be regarded as eclectics in a certain sense. However, those belonging more particularly to this class include Plutarch, Plotinus, and Epictetus. Victor Cousin, the French writer on the history of philosophy, is the most eminent modern eclectic.

ECLECTIC SCHOOL OF MEDICINE, the school of medicine which relies upon treating patients as thought advisable by the physician rather than to follow closely the instruction of schools. It is an American system and is known also as the New School of Medicine, though it may more properly be said to be the modern representative of a system of healing that dates from the year 200 B. C. It must not be assumed that the eclectic practitioner is an absolute individual, but rather that he relies upon individual judgment while at the same time he keeps in mind what has been learned in medicine and the art of healing by experiments. Wooster Beach founded an eclectic college in New York City in 1826, and it may be said that the modern eclectic school of medicine dates from the early part of the 19th century. He published a number of text-books which are still looked upon as standard, and founded colleges in a number of states. In 1870 the National Eclectic Medical Association was incorporated in New York and since then other associations of the same kind have been organized, all of which have for their aim the improvement in the art of healing. While the medicines generally employed in the treatment of diseases are used by this school, in theory it does not favor the employment of mineral substances and is an advocate of using native plants that possess medicinal properties. This position in relation to plants has been the means of obtaining much information regarding American plants useful in the treatment of diseases. In 1908 there were about 875 students in attendance at 24 eclectic medical colleges in the United States.

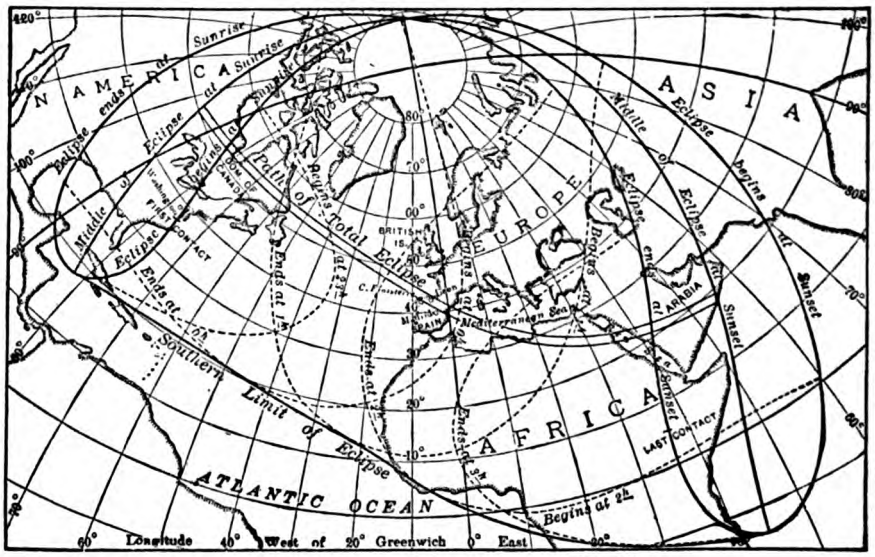
ECLIPSE (ē-klĭps'), an obscuration, partial or total, of a heavenly body by its entering the shadow of another body, as when the moon enters the shadow of the earth, or a satellite that of a planet. An eclipse may occur by the partial or total disappearance of the sun as the effect of the passage of the moon between it and an observer. Stars, planets, and the satellites of planets may be eclipsed, but the principal eclipses are those of the sun and moon. An eclipse of the sun begins by an obscuration of the western side of the disc and ends on the eastern, while an eclipse of the moon begins on the eastern and ends on the western side.



ECLIPSES.
S, sun; *E*, earth; *M*, moon; *P P*, penumbra.

SOLAR. When the sun and moon are in conjunction at the time of new moon, the moon is necessarily between the earth and the sun, the three bodies being in a straight line, as shown in Fig. 2. This causes an eclipse of the sun. If the moon's orbit were in the same plane as the ecliptic, an eclipse of the sun would occur at every new moon; but, since the orbit is inclined, an obscuration can occur only at or near a node. As a consequence of the diameter of the moon being comparatively small, the cone of the shadow cannot enshroud to exceed 180 miles in breadth of the earth's surface. Within this region occurs a *total eclipse,* and for a certain distance beyond only a portion of the sun's disc is obscured, where the eclipse is said to be *partial.* When the eclipse takes place at the time the moon is farthest from the earth, its disc does not cover the disc of the sun, thus leaving a ring exposed o the vision of the observer. This is known as an *annular eclipse.* The longest duration possible of a total eclipse of the sun in any locality is only about eight minutes.

An unusually interesting total eclipse of the sun occurred Aug. 30, 1905. In the accompanying illustrations are shown the path of the eclipse and the result of observations taken on board the *Lucania,* a vessel belonging to the Cunard Company, while at sea during a westward passage. At sunrise the path of the total eclipse came in contact with the earth near Lake Winnipeg, passed north of Newfoundland into the Atlantic, reached Spain at noon, passed over Northern Africa, and ended in Arabia. The maximum velocity was 2,000 miles per hour; average 1,000 miles; width of path of total eclipse, 160 miles; duration of totality, 2½ to 3¾ minutes. Cloudy weather made observations in Labrador unsatisfactory, but good results were obtained in Spain and Northern Africa. The Lick Observatory sent a party to Egypt, where a number of fine views were



PATH OF THE TOTAL ECLIPSE, AUG. 30, 1905.

taken with photographic telescopes. In that region the shadow bands were nearly parallel and moved as fast as a walking man. During the eclipse little variation was shown by terrestial magnetic elements.

LUNAR. Eclipses of the moon are caused by the moon passing through the earth's shadow, as shown in Fig. 1. They can only occur at full moon. The moon does not disappear completely even in a total eclipse, because of the refraction of the solar rays in traversing the lower strata of the earth's atmosphere. Since a *penumbra* surrounds the shadow of the earth, it sometimes occurs that the moon does not reach the true shadow, passing only partly within the penumbra. There never can be an annular eclipse of the moon, for the reason that the earth's shadow exceeds in diameter the moon's disc. Total eclipses of the moon are rarer events than those of the sun, yet are seen more frequently, for the reason that they are visible over the entire unillumined hemisphere of the earth, and also because of the long duration of the eclipse, which may last several hours.

Total solar eclipses at any given point on the earth's surface are exceedingly rare; prior to 1715 none had been visible at Paris, France, for five and a half centuries. In ancient times the people were very much frightened during an eclipse, and thought them presages of dire events. All manner of frantic efforts were made to drive them away. At one time the laws of Rome made it punishable blasphemy to talk publicly of their being due to natural causes. See **Sun; Moon.**

ECLIPTIC (ē-klĭp'tĭc), the apparent yearly path of the sun around the celestial sphere. It was so called by the Greeks for the reason that they observed that eclipses of the sun and moon can occur only when these bodies are near this circle. The earth's axis is not perpendicular to the plane in which the sun appears to move, but is inclined 23½°. If the stars could be observed in the daytime, the sun would be seen to be moving slowly among them toward the east, just as the moon does at night; this path is the *ecliptic.* Now, if the earth's Equator is imagined to be extended as a great circle into the heavens immediately above its true position, it is known as the *celestial equator* and cuts the ecliptic at the equinoxes. The position of the sun on March 21 and Sept. 21 is on the Equator or equinoctial points. Then, there are two periods in the year when the sun has reached its greatest distance from the Equator —June 21 and Dec. 21. These four points are distant from each other by a quadrant of a circle, or 90°. Each quadrant is divided into three arcs, or 30°, from which are reckoned twelve signs of 30°, called *signs of the zodiac,* being named from constellations through which the ecliptic passes. The equinoctial points are not fixed, but recede westward about fifty seconds in a year, while the angle at which the ecliptic stands to the Equator is diminishing also about fifty seconds in a century. The de-

crease, however, has a limit, and there is a point beyond which it can never pass. It requires 8,000 years to change a degree, and this can never sensibly affect the seasons.

ECLOGUES (ĕk'lŏgz), a class of pastoral poems, so named from the *Eclogues* of Virgil. The poems of this class relate the loves and adventures of shepherds and shepherdesses. Spenser's "Shepherd's Calender" is a good example of an English eclogue. Pope made this class of literature popular in the 18th century.

ECONOMICS (ē-kŏ-nŏm'ĭks). See **Political Economy.**

ÉCOLE DES BEAUX ARTS (ā-kôl' dā bō zär'), the national school of fine arts in Paris, France, founded as an academic school by Mazarin in 1648. The present name was not given to it until 1815, and a system of workshops were added to the main institution in 1863. It is situated in the Villa Medici, on the Pincian Hill, and takes rank as one of the most important schools of fine arts in the world. Both men and women between the ages of fifteen and thirty have free access to the courses, which include drawing, sculpture, painting, engraving, architecture, modeling, and gem cutting. Foreign students are not subject to the age regulation and not eligible to the *Prix de Rome*, which was established in 1666. Students may remain as long or short a time as they desire, but the regular course is from eight to ten years. About 40 teachers give instruction, twelve in the workshops and 28 in the École proper, and the students number approximately 1,350.

ECUADOR (ĕk-wä-dōr'), a republic of South America, located mostly south of the Equator. It extends from 5° south latitude to 1° 45′ north latitude. Its northern and eastern boundary is formed mainly by Colombia; southern, by Peru; and western, by the Pacific Ocean. The boundary between it and Peru and Colombia has been in dispute for many years, hence the area cannot be stated with accuracy, but is usually given at 118,500 square miles.

DESCRIPTION. The surface is divided naturally into the extensive plains in the east, the elevated mountain regions through the center, and a narrow coast region lying between the latter and the ocean. Many of the mountains are active volcanoes, and the ranges are traversed by longitudinal valleys and plateaus. Two chief mountain ranges, both containing snow-clad summits, traverse the country in a direction from north to south, though the western of these has the more highly elevated peaks. It contains the highest summit in Ecuador, Chimborazo, elevation 20,500 feet, but its peaks as a whole are generally lower than those of the eastern range. The loftiest mountains of the latter are Antisana, Cayambé and Cotopaxi, the last mentioned being 19,612 feet. The sea coast is quite uniform, being indented only by the Gulf of Guayaquil. Many of the plateaus take the form of valleys among the mountains and their soil is generally fertile. In the eastern part of the country, east of the Andes, is an extensive fertile plain belonging to the Amazon basin.

A larger part of the country slopes toward the east, and the drainage is chiefly by tributaries of the Maranon, as the upper course of the Amazon is called. These tributaries include the Napo, the Putumayo, and the Japura, and some of these streams furnish transportation facilities with the Amazon. The rivers of the western slope are short and flow rapidly. They include principally the Mira and the Esmeraldas. Ecuador has numerous lakes, but all of them are small.

The climate is tropical, but is greatly modified by differences in altitude. Excessive heat and moisture render the eastern and western plains unhealthful, but some parts of the elevated interior are delightful, especially the valleys of the Andes that have an altitude of about 8,000 feet. The regions that have an elevation of more than 9,000 feet have a cold and rigorous climate, but habitations are met with at much greater heights in many of the mountains. It may be said that the dry and the rainy seasons form two divisions of the year, the former from June to November and the latter from December till May. In the deep river valleys the thermometer seldom registers below 80°, while the elevated summits are covered with snow perpetually. The rainfall is abundant in all parts of the country, hence fine grasses and thick forests are abundant. Tropical vegetation thrives in regions elevated less than 6,000 feet, and above that it becomes more rigid. Among the wild animals are the tapir, alpaca, jaguar, monkey, vicuña, and many birds of prey and plumage.

AGRICULTURE. Farming is the chief industry and cacao is the principal product. It is cultivated extensively in the provinces of Oro, Manabi, and Guayas. Coffee takes second rank and is grown chiefly in the lowlands. Sugar cane is cultivated quite extensively. Indian corn, rice, tobacco, wheat, barley, and oats are grown profitably. The forests yield chinchona bark, sarsaparilla, vegetable ivory, and rubber, and the trees yielding these products are grown with considerable care. Alfalfa is cultivated for hay. All the domestic animals common to North American thrive, but sheep and cattle receive the larger share of attention.

MINING. Many minerals are found in the mountains, including coal, iron, zinc, and the precious metals, but very little has been done to develop the mineral resources. Gold is the chief mineral product, and copper and petroleum are obtained, though in comparatively small quantities. The lack of development may be attributed both to the lethargy of the people and a general lack of transportation facilities.

MANUFACTURES AND COMMERCE. The manufacturing interests are developed but slightly,

the most important products including flour, lumber, leather, cotton goods, clothing, and sugar. Coarse fabrics and straw braid used in making hats and other straw articles are produced in considerable quantities. Fruits and fish are canned to some extent for transportation. The exports usually exceed the imports. Foreign trade is chiefly with France, Germany, Great Britain, and the United States in the order named.

Most of the interior trade is carried by pack animals, owing to the fact that the highways are not improved and become almost impassable in the rainy season. A good highway is maintained most of the way from Quito to Guayaquil, the chief port. Not more than 265 miles of railways were in operation in 1900, the principal line extending from Guayaquil inland, but a line from Quito to Aquayaquil, about 300 miles in length, was completed in 1905. In 1908 the total lines in operation had a length of about 500 miles. Most of the telegraph and railway lines were built by foreign capital.

INHABITANTS. The population is composed largely of a mixture of Negroes, Indians, Spanish Creoles, and Whites. The white inhabitants are in possession of most of the land and manage the business enterprises, while the colored races engage in agriculture and hunting. It may be said that the Indians consist chiefly of two classes, of which the descendants of the Incas are the most numerous and most highly developed in civilized arts. Spanish is the official and spoken language, and Roman Catholic is the state religion, though other faiths are tolerated. Education has made little advancement among the common people, but a number of elementary and secondary schools are maintained. The national university is located at Quito. Quito, the capital, is the largest city and Guayaquil, on the Gulf of Guayaquil, is the chief seaport. Other cities include Cuenca, Riobamba, Latacunga, and Ambato. Population, 1916, 1,550,000.

GOVERNMENT. Ecuador is divided into sixteen provinces. The constitution vests the executive authority in the president and a ministry, and the president is elected for a term of four years. The congress consists of two houses, the senate and the house of representatives, the members of which are elected by direct vote, in the former for four years and the latter for three years. All male citizens who have attained to the age of 21 years and are able to read and write are granted the right of suffrage. The Indians were practically in a condition of slavery and were not represented until 1896, when they were admitted to citizenship under certain restrictions. A supreme court of six judges constitutes the highest judiciary. The standing army consists of only 3,500 men and the navy is not materially strong, being made up of a few torpedo boats and transports.

HISTORY. The early inhabitants of Ecuador were advanced in many of the arts of civilization, and they had many writings and records that were destroyed when their dominion was overthrown. At the time Pizarro conquered Peru for the Spaniards, Ecuador formed part of the great empire of the Incas. From 1564 until 1718 it existed as an independent presidency under Spain, and in the latter year became a part of the state of New Granada. A revolution in connection with adjoining countries against Spain secured its independence in 1822, when the Spaniards were defeated in the Battle of Pichincha, and in 1831 it was organized as a separate republic. The present constitution dates from 1906, and since then the country has enjoyed an era of reasonable progress.

EDDA (ĕd'dȧ), the name by which two ancient Icelandic works in literature are known. The term means "great-grandmother," and is a fitting appellation of this work, being an interesting forerunner of Scandinavian literature. The "Poetic Edda" was compiled in the 13th century and contains mythical poems, while the "Prose Edda" was written partly about 1230 and was discovered in 1628. The poems of the former praise the deeds of Scandinavian gods and heroes, while the latter treats of northern myths, exemplifies Scaldic poetry, and comments on the achievements of Haco of Norway, who died in 1263.

EDDY, Clarence, organist and composer, born in Greenfield, Mass., June 23, 1851. He first studied under Dudley Buck at Hartford, Conn., and later under August Haupt in Germany. In 1875 he returned to the United States and was elected organist of the First Congregational Church in Chicago, and subsequently held a like position in the First Presbyterian Church of the same city. In 1877 he was elected director of the Hershey School of Musical Art of Chicago. Concerts given by him at the Centennial Exposition in 1876 and the Paris International Exhibition attracted much favorable comment. In 1896 he was made a member of the Saint Cecilia Academy at Rome. Among his published works are a translation of Haupt's "The Theory of Counterpoint and Fugue" and "The Church and Concert Organist."

EDDY, Mary Baker Glover, author and moralist, born at Bow, N. H., July 16, 1821; died in Boston Dec. 4, 1910. She studied in her native town and afterward removed to Charlston, S. C., having married George W. Glover in 1843, who died of yellow fever the following year. In 1853 she married Daniel Patterson, a dentist of Tilton, N. H., from whom she was divorced in 1873. Four years later she married Asa G. Eddy, one of her students, who died at Boston in 1882. Her only child, George W. Glover, was born in 1844 and made his home in Minnesota and South Dakota most of his life.

In 1861 she met Dr. Phineas P. Quimby, from whom she took treatment and learned of his system of treating diseases without medicine.



MARY B. G. EDDY.

Mrs. Eddy fixed 1866 as the year in which she discovered Christian Science, to the teaching of which she devoted much time and careful study. In 1879 she established the first church of that faith in Boston and two years later opened the Metaphysical College. "Science and Health, with Key to the Scriptures," is her most widely known publication, which she issued in 1875, and nearly half a million copies have been sold. This work gives an outline of the understanding that Christian Scientists have of the Bible, and, besides it, she wrote many other publications and lectured extensively in support of her religious belief. In 1908 she was decorated with the jeweled insignia *an officer d'académie* of France. Her works include "Unity of God," "People's Idea of God," "Christ and Christmas," "The Pulpit and Present Christian Science versus Pantheism," "Retrospection and Introspection," and "Messages to the Mother Church."

EDDYSTONE LIGHTHOUSE (ĕd'dĭ-stōn), a celebrated lighthouse of England, situated in the English Channel, on a group of rocks called Eddystone. Owing to tides covering the rocks daily, it became necessary to guard against shipwrecks at this point of danger. The first lighthouse was completed in 1700, but was destroyed by storm in 1703, and the second was burned in 1755. The third was a massive structure of limestone, with a granite inclosure at the foundation, and of sufficient height to cast a light thirteen miles. Owing to erosions at the foundation rocks by the action of sea waves, a new one was completed in 1882. This structure is the highest yet built at this place. It is equipped with the newer modern appliances and casts a light nearly eighteen miles.

EDEN (ē'dĕn), the locality in which the first human family had its residence. In the eastern part of it was a garden, which was watered by a river and from thence the stream parted into four channels, though we have been unable to locate its exact place. Both the early Hebrew and Aryan writers believed that the human race first inhabited the mountains of Central Asia and that Eden was located in that part of the continent. At present it is generally assigned to Babylon and Armenia, with the preponderance of argument in favor of the former. The New Version of the Bible speaks of it as the Garden of Eden, and Milton calls it Paradise in his "Paradise Lost."

EDENTATA (ē-dĕn-tā'tà), or **Toothless Animals,** an order of mammalia established by Cuvier. The ant-eaters and pangolins are the only edentata that are absolutely destitute of teeth; but, with the single exception of the armadillo, which has one, none of the order have any incisor teeth, and the back teeth are very imperfect, being destitute of enamel and distinct roots. The sloths belong to one tribe of this order and alone subsist on vegetable food. The armadillos, pangolins, and ant-eaters subsist on insects or on animal substances in a decaying state. No fossil forms of the ant-eaters and sloths have been found, but the edentata is represented by the extinct Megatherium and other mammals of gigantic size.

EDGAR (ĕd'gạr), called the Peaceable, son of King Edmund I., and one of the most distinguished of the Saxon kings of England. In 959 he succeeded to the throne, administered the civil and military affairs of his kingdom with marked energy and success, and gained the universal respect of his people. Being a patron of the monks, he was guided in ecclesiastical affairs by Saint Dunstan, Archbishop of Canterbury.

EDGAR, Sir James David, author and statesman, born at Hatly, Quebec, Aug. 10, 1841; died July 31, 1899. He was liberally educated and entered politics. In 1872 he was elected to Parliament, serving until 1874, and was reëlected in 1884, 1887, and 1891. He was an influential factor in securing the passage of a copyright bill in 1889, and for some time served as speaker of the House of Commons. In 1897 he was made a member of the Privy Council. His publications include "Canada and Its Capital," "This Canada of Ours, and Other Poems," and "The Insolvent Act of 1864."

EDGAR ATHELING, King of the Saxons, grandson of Edmund Ironside, born about 1057; died about 1120. He was born in Hungary, where his father was an exile, and was proclaimed King of England by the Saxons after the Battle of Hastings, but William the Conqueror displaced him. In 1097 he made an expedition into Scotland to reinstate his nephew Edgar as king of that country. Two years later he joined the Crusade, but returned to England and aided Duke Robert in his struggle against Henry I. The last years of his life were spent in England.

EDGEHILL, the locality of the first important battle of the Civil War in England. It was fought on Oct. 25, 1642, when King Charles had decided upon attacking London, but was met by 10,000 troops of Roundheads under command of the Earl of Essex. The army of the king numbered about 12,000, taking a stand on Edgehill, and their command rested largely with Prince Rupert. This commander led the right wing of the Royalists and made a gal-

lant charge upon the left wing of the Roundheads, pursuing them for several miles. The Roundheads inflicted a severe loss upon the royal infantry and succeeded in driving the opponents back. Though the Royalists suffered the heavier losses, the battle terminated as an indecisive struggle.

EDGEWORTH (ĕj'wûrth), **Maria,** novelist, born near Reading, England, Jan. 1, 1767; died May 21, 1849. She removed with her father to Ireland in 1782, and under his direction received a careful training in literature. In 1798 she joined her father in publishing "Practical Education," and soon after issued "Essay on Irish Bulls," the latter dealing with many incidents in Irish life. These were followed by many novels and other writings, all of which are interesting for their excellent sense and agreeable humor. They include "Popular Tales," "Stories of Ireland," "Leonora," "The Absentee," "The Parent's Assistant," and "Tales of Fashionable Life."

EDICT OF NANTES. See **Nantes.**

EDINBURGH (ĕd"n-bŭr-ô), the second city and the capital of Scotland, in the county of Midlothian, 46 miles east of Glasgow. It is located on a series of ridges and is surrounded on all sides by mountains, except the north, where the ground slopes gradually toward the Firth of Forth. The site of the ancient city was on the central ridge running from west to east, which is terminated on the north by a high, rocky cliff now containing the Castle, and on the east by Holyrood House. Castle Hill and Arthur's Seat, the latter 822 feet high, and several other lofty elevations overlook the city. Prince's Street, a fine promenade, divides the city into the two parts known as the Old Town and the New Town. Between the two parts are charming recreation grounds and the National Gallery and the Royal Institution. Cowgate Street and High Street intersect the Old Town and are the principal thoroughfares. Portobello, on the Firth of Forth, is included in the city.

Edinburgh is the seat of the supreme courts of Scotland and has several fine government buildings. Among the noteworthy structures are Saint Giles's Church, a beautiful edifice in the Gothic style; Victoria Hall; Tron Church; the Bank of Scotland; the Advocates' Library, with 490,000 volumes; the Signet Library, with 70,000 volumes; and a fine public library built by Andrew Carnegie. The Palace of Holyrood, which dates from the 12th century, had its origin in the abbey founded by David I. In the crown room of the Castle, located on Castle Hill, are the crown regalia, known as the *Honours of Scotland.* This building was the scene of many events in the life of Mary, Queen of Scots, and here her son James was born.

The city is noted for its progressive position in the management of public utilities, such as the systems of waterworks, sewerage, and gas and electric lighting. It is well connected by railroads and electric car and telephone lines, and has beautiful parks, boulevards, and paved streets. Among its leading manufactures are beverages, machinery, soap, clothing, paper, fabrics, and earthenware. The public school system is well established. It is supplemented by numerous high schools, academies, and the famous University of Edinburgh (q. v.).

Edinburgh is mentioned as having been the capital of the King of Northumbria early in the 7th century, and was named from King Edwin, a powerful monarch, who absorbed the Lothians and added them to his dominion. Robert Bruce made the city a borough and caused the establishment of a port on the Firth, now called Leith. It became the capital of Scotland in the 15th century, the first wall for its defense being built in 1450. After the defeat at Flodden in 1513, the walls were enlarged to include Cowgate. The English burned the city in 1544, and Queen Mary made it the seat of her short reign in 1561. When Scotland became united with England in 1707, the city was materially affected by the removal of the Scottish nobility, but in 1745 the Pretender made it his seat of action for a brief period. Population, 1911, 320,315.

EDINBURGH, Alfred Alexander William Ernest Albert, Duke of, Prince of Saxe-Coburg and Gotha, second son of Victoria, Queen of England, born at Windsor Castle, Aug. 6, 1844; died July 30, 1900. His early education was by special tutors. At the age of fourteen he entered the royal navy as a cadet, to serve in the Mediterranean and American waters, and declined the throne of Greece in 1862. In 1866 he was created Duke of Edinburgh, Earl of Kent, and Earl of Ulster, by Parliament, with a grant of $75,000 a year. He was given command of a frigate in 1867 and served in Australian waters, but later made an extensive voyage, visiting Japan and China. In 1874 he married Grand Duchess Marie, only daughter of Czar Alexander II. of Russia. He took the oath of loyalty to the German Empire in 1893, succeeding to the title of his uncle, the Prince of Saxe-Coburg and Gotha, Duke of Saxony. He was given the rank of general of infantry in the German army soon after, in which he rendered service of value.

EDINBURGH UNIVERSITY, a noted institution of higher learning in Edinburgh, Scotland. It was founded in 1592 under a charter granted by James VI., though it did not attain its higher sphere of influence until the early part of the 18th century. Originally it had only four regents, besides the principal professor. At present it has a faculty of 125 and maintains four extensive departments, including medicine, law, arts, and divinity, each conferring appropriate degrees on graduation. The government is vested in a body known as the sen-

ate, and the officers consist of a chancellor, rector, and principal. It is provided that the acts of the senate are subject to review by a university court, the members of which are appointed partly by the town court and partly by the university authorities. The present building of the university was begun in 1789. In its library are 2,500 manuscripts and 220,000 printed volumes, though this is supplemented by several large department libraries. In connection with it are numerous learned societies and museums devoted to natural history, general history, and anatomy. A number of fellowships and scholarships are granted annually. The number attending the different departments aggregates about 3,150. Some of the most eminent English teachers have been professors in this institution, and among its graduates are such prominent men as Scott, Carlyle, Goldsmith, and Darwin.

EDINBURGH REVIEW, a periodical established at Edinburgh, Scotland, by Sydney Smith in 1802. In this enterprise he was aided by Francis Jeffrey, Henry Brougham, Francis Horner, and a number of others. This publication was the first of the critical periodicals to be established in the 19th century. It exercised a wide influence in favor of the Whig party, but was relatively more important as a review of and factor in literature. Macaulay and a number of other eminent writers contributed to this periodical.

EDISON (ĕd'ĭ-sŭn), **Thomas Alva,** electrician and inventor, born in Milan, Ohio, Feb. 11, 1847. His early education was limited to the instruction given by his mother and the culture coming from reading and self-activity. Though studious on general lines, he directed his attention largely along the line of chemistry. He secured a position as newsboy on the Grand Trunk Railroad at the age of twelve years, and for a time published the *Grand Trunk Herald* in the baggage car of the train on which he was at work. Subsequently he became interested in studying telegraphy, most of his work being at night in a railway station, yet he developed into an expert. Soon after he was employed as an operator in several Canadian towns and afterward at Adrian, Mich. Besides attending to his duties, he fitted up a repair shop in which instruments were treated and improvements on existing machinery were attempted. While at Indianapolis he invented his automatic repeater, a device by which messages can be sent from one wire to another without an intervening operator.



THOMAS A. EDISON.

Edison's duplex telephone was invented at Boston, where he had been called by several men of means. He became connected as superintendent with the Gold and Stock Telegraph Company of New York in 1871 and in the same year transferred his shop to Newark, N. J. From this position he resigned after five years in order to devote his entire time to invention and research, locating at Menlo Park, N. J., from which he is often spoken of as the "Wizard of Menlo Park." Later he established his home and headquarters in Newark, N. J. He secured about four hundred patents on inventions and improvements along different lines of instruments and machinery. Among the most useful, besides those mentioned above, are the phonograph, improvements on the electric light and the telephone, the electric pen, the microphone, the megaphone, the kinetoscope, the microtasimeter, and the quadruplex and sextuplex transmitters. In 1915 he was made chairman of the Naval Consulting Board, an organization created to improve the navy.

EDMONTON (ĕd'mŭn-tŭn), a city of Canada, capital of the province of Alberta, 800 miles northwest of Winnipeg. It is located on the Saskatchewan River and on the Canadian Pacific, the Canadian Northern, and the Grand Trunk railways, and is surrounded by a fertile farming and grazing country. Coal, gold, silver, and platinum are mined in the vicinity. The principal buildings include those of the government, the public library, the city hall, the high school, and a number of substantial churches. The public utilities, including electric lights, waterworks, sewerage, and a gas plant, are well established. It is the center of a vast region which is easily reached by railways, hence is a growing market and has a large retail and wholesale trade. Strathcona was annexed to Edmonton in 1911. Population, 1911, 24,900.

EDMUND (ĕd'mŭnd), the name of two early kings of England. Edmund I. succeeded his brother, Athelstan, in 940. In his vigorous reign Cumbria was conquered and bestowed on Malcolm, King of Scotland. While at a banquet, on May 26, 946, he was slain. Edmund II., called Ironside, eldest son of Ethelred II., was born in 989. A division caused the two political parties to elect both him and Canute as king, the former in 1016. Though victorious over Canute in several battles, he was defeated in Essex, and compelled to cede large tracts of territory. His reign terminated by his death in about seven months, and Canute became king of the whole of England.

EDMUNDS, George Franklin, statesman, born in Richmond, Vt., Feb. 1, 1828. His education was received in the public schools and by instruction under a private tutor. Later he studied and practiced law, and was a member of the Legislature of Vermont from 1854 to 1859, serving three years as speaker. In 1861-62 he was a member of the State Senate, serving as

presiding officer pro tem. Soon after he was appointed to fill a vacancy in the United States Senate, in which he was distinguished as an opponent to President Johnson in his reconstruction policy and favored his removal from office. He was elected by the Legislature in 1866 to fill the unexpired term of Solomon Foot and remained in the Senate consecutively until 1891, when he resigned on account of impaired health. Edmunds served as a member of the electoral commission of 1877, casting his vote for R. B. Hayes. After Arthur was elevated to the Presidency, he became president pro tem. of the Senate. Among the best known of the many important laws written by him is the act for the suppression of polygamy in Utah, which is known by his name. As a parliamentarian and skilled legislator he took very high rank among the statesmen of the United States.

EDOM (ē'dŭm), meaning *red,* the name given to Esau on account of the red pottage secured by him from his brother Jacob. The name was also given to the country settled by Esau, having been previously known as Mount Seir. It was about 100 miles long and twenty miles wide and was situated between the Dead Sea and the Gulf of Akabah, an inlet from the Red Sea. Bozrah, now Buseirah, situated in the extreme northern part, was its chief city and the capital. During the reigns of David and Solomon, Edom was under subjection to the Israelites. Later the Edomites ravaged the southern borders of Palestine, and were denounced with considerable vehemence by some of the prophets of Israel. After the destruction of Jerusalem, in 70 A. D., the name of Edom or Idumaea disappeared from geography.

EDUCATION (ĕd-ū-kā'shŭn), a word derived from the Latin *educare,* meaning to lead forth. In a philosophical sense education is the natural inheritance of every individual, since he is impressed and developed for good or evil by all with which he comes in contact, everything he sees, feels, hears, and does influencing action and forming tendencies. According to this view, education begins with parental influence and terminates only when life ceases. The more common application of the term involves the efforts premeditated by parents and teachers to induce exercise of the powers of the learned in such a way as to become the most possible in physical strength, intellectual power, and moral goodness. To accomplish this high ideal, those instructing need to know the laws under which human development makes the most efficient progress; they must understand the possibilities of the student, and also be capable to administer precepts and examples to good purpose, in the process encouraging what is good to the individual and discouraging the tendencies that may result in harm.

FUNDAMENTALS. In a rational system of education it is necessary to enrich the life of every member of society with the fundamental elements and basic principles that underlie true development. This should be done for the universal good, and to the fullest extent of the personal capacity of each individual. In addition to the general culture that ought to be secured to all, there should be more or less technical training to fit for the calling in life by which the learner desires or is likely to support himself. Such an education necessitates a well-organized system of elementary schools at which all may be trained, secondary schools for a smaller number, and colleges and universities for those expecting to assume higher responsibilities or enter the learned professions.

However, education is not creative in its nature. Its aim is to attain the fullest development and highest right activity of the faculties of the body, mind, and soul. To accomplish this it is necessary to cultivate by right activity all the pliant, plastic innate powers by means of a continuous culture well adapted to individual needs. The culture must aim at harmonious training of all the faculties, having for its object the development of existing possibilities into realities. It must take account of every need in order that the highest possible form of learning, development, and efficiency may result.

THREEFOLD AIM. The true aim in education is threefold and deals with the physical, intellectual, and moral. *Physical culture* should train the body that it may be strong, healthy, vigorous, graceful, skillful, and responsively active to the will. *Intellectual training* should engage the mind with and develop the love for knowledge, qualify for the independent acquisition of knowledge, and prepare for regular practice in the use of knowledge. *Moral culture* should strengthen the conscience and will by the formation of habit in carrying out pure feeling and good thought, to secure ready obedience to law as the embodiment of right, induce a consciousness of individual power and responsibility, and implant self-faith as the result of faith in a divine Providence.

EDUCATIONAL SYSTEMS. The systems of schools for the general dissemination of education have been and still are greatly diversified in courses of study, and the scope of education itself has shown marked differences in all ages and civilizations. All the countries that take some rank in educational arts maintain at least a portion of the general system that should be fostered in all highly civilized states. A complete system of the schools involves the establishment of many institutions with diversified courses of study, each aiming to cover its portion of a general system, and articulating in a well-connected way with others.

Among the schools recognized by the leading nations are: 1. *Kindergartens,* schools in which the young are trained to develop right activity of the body, though some attention is usually given to elementary growth in intellect. In

communities not recognizing this class of schools essential in the process of education, the elementary work is done largely in the homes by mothers or private teachers. 2. *Common schools,* institutions designed for teaching the rudimentary branches, with courses of study so graded as to prepare the pupil for the various higher institutions. 3. *Schools of agriculture,* comprising courses in gardening, botany, horticulture, geology, vegetable chemistry, zoölogy, pomology, and surveying. 4. *Industrial schools,* including the teaching of industrial labors and work and the arts of trade. 5. *Schools of fine art,* those designed for educating artists in the various fine arts, such as sculpture, painting, music, poetry, and architecture in its character as art. 6. *Schools of technology,* institutions designed to teach civil, electrical, and military engineering, geology and mining engineering, photography, engraving, building, navigation, telegraphy, and astronomy. 7. *High schools,* institutions having courses of study covering higher branches of learning than the common schools, and designed to prepare pupils for institutions in which they may secure such training as will best fit them for their vocation in life, among them those named below. 8. *Schools of business,* in which students are trained in all classes of business, such as banking, commerce, manufacturing, and office work. 9. *Law schools,* institutions for the education of lawyers. 10. *Normal schools,* the institutions established exclusively for the education of teachers. 11. *Schools of medicine,* those containing courses and facilities for the education of surgeons and doctors of medicine. 12. *Colleges,* institutions where the highest branches of knowledge and science are to be taught, and having courses designed to prepare a corps of men devoted exclusively to culture and science. 13. *Universities,* the highest institutions of learning, in which the most extended courses of study are offered to men and women who aspire to the more learned attainments in the arts and sciences, and to fit them for the greatest activity and highest good in the professions of law, medicine, ministry, and teaching, and for philosophical work. In each class the highest development of the moral faculty is to be made an objective point, which is the case in all the schools of the most progressive nations. The higher lines of education, above the basic, have been designated as moral, political, aesthetic, philosophical, and religious.

HISTORY. The history of education is concerned, more or less, with every epoch from which any record has passed down to us. Few studies are of deeper interest than the one that traces the systems under which man's influence upon nature was enlarged through the successive centuries, and by means of which he attained his present high development. Whether man in the beginning occupied a higher or lower status than at present has been a subject of controversy from remote times, though, so far as profane history is concerned, it is evident that he has been enabled to attain greater power and influence through the impulse of educational arts. Sacred history represents the first parents created in the image of God, and accords them efficiency to reason and converse with each other. Cain was not only a tiller of the soil, but is represented as a builder of a city which he named Enoch, after his firstborn son. In the seventh generation from Adam, and while that patriarch still lived, it is recorded that Tubal-Cain "was an instructor of every artificer in brass and iron," and that his half-brother, Jubal, "was the father of all such as handle the harp and the organ."

While it is impossible to determine the exact status of antediluvian education, it is evident that in the twilight ages man advanced materially in civilized arts. The invention of the organ and the harp, and the skill of artificers in brass and iron, imply that many others and related discoveries and inventions had been made. However, advancement in education dates from and is measured largely by the art of writing, this art being considered the prime meridian from which to measure. Committing thought to writing made it possible to pass funds of knowledge from generation to generation with much better results than by story and tradition. Besides, all succeeding generations were enabled to ponder the achievements of preceding ages, as well as profit by the failures and successes of the generation that preceded them. The writings were not necessarily made up of such characters as are used exclusively by the Caucasians at present, but included various forms of hieroglyphics and symbolical characters on monuments, stones, and architectural structures.

Oriental Nations. Among the early civilizations and antiquities the Chaldean, Babylonian, and Assyrian take high rank, and much knowledge of their skill and progress has come to us through various sources by means of monumental writings and architectural ruins, most of which are given us by the Greek historian, Herodotus, and the German, Max Müller. The rise of the Chaldean civilization dates from Nimrod, about 2300 B. C., when Babylonia was founded. These ancient peoples erected great cities, collected vast libraries, founded schools, and disseminated knowledge and learning for many centuries. Passing from their settlement on the Tigris and Euphrates to Egypt, we find a high state of civilization and a wide range of culture that had their beginning more than 4,000 years ago. In their city of Alexandria was a great university, which taught a system of geometry perfected by Euclid, and in accord with which and other productions the Egyptian intellect towered and expanded, attaining a foothold almost as durable as their gigantic pyramids and the time-enduring sphinx. Their

system of education, like that of India, was largely characterized by the baneful influence of castes, resulting in classes who towered as educational giants on the one hand, and descended to the status of intellectual pigmies on the other.

In scrutinizing human history it is remarkable that practically every portion of value in education comes generally from the Caucasian race, the Mongolian being the only other race that presents any original theories and primitive acquirements of material knowledge. The educational system of China dates from Confucius, who lived about 500 years before Christ, and ever since his teachings have had a marked influence upon the Chinese and some effect among the Japanese, though Brahmanism and Buddhism have had more or less influence upon the education of both peoples. China still adheres closely to the educational theories and practices of the ancients, neglecting the education of women, but grading promotion in state affairs entirely upon educational merit, while Japan is breaking away from the old with remarkable rapidity and inaugurating schools and courses of study maintained in the systems of modern states. The latter people are distinguished by greater energy and independence of character than the Chinese, and are willing to inaugurate the newer and better, even if many traditional and time-tested institutions must be set aside.

Ancient Classical Nations. From Western Asia and Northern Africa education moved westward to Greece, and eventually from Greece to Rome. According to the writings of Homer, it is certain that the early education of Greece was patriarchal. Later four divisions arose, of which the Dorians and Ionians are the most noteworthy. The seat of influence of the former was at Sparta, and their higher education was largely the outgrowth of the codified laws of Lycurgus, though the teaching of Pythagoras influenced the whole of Greece by its strictness and aristocratic tendencies. Solon codified the laws of the Ionians. Their center of influence was at Athens. Socrates, Plato, and Aristotle are the great teachers of Greece, and rank highest in power and influence.

Numa Pompilius founded Roman education, though Greek culture was introduced in its entirety about 250 B. C. The great orator, Cicero, gave perfection to Roman rhetoric, while Seneca and Quintilian rank as the greatest educational writers. Greek education aimed to develop especially the beautiful and good. The Greeks as well as the Romans maintained a highly educated priesthood, though education was extended to all save the slaves and extremely poor. The young were trained early in life. Physical and intellectual strength were objective in all, while their religious culture consisted of the worship of representative gods, such as we read of in mythology. These were sacredly represented in statuary, temples were built to their honor, and the young were admonished to do them reverence.

Early Christian Era. The influence exercised by the teachings of Christ is the most marked and contains the essential and basic principles of education. They oppose all external distinction among men, recognize the equality of women, and make capability the only limit of man's development. By their precepts man is taught to become perfect, and live, grow, be active, avoid stagnation, and seek progress and expansion. Its injunctions require activity, according to the talents possessed. Those who have the greater capabilities are presumed to accomplish the most and serve the higher and more useful purposes in society. Upon these principles of teaching every true system of modern education is based. They sustained the severest criticisms of the Middle Ages, were embraced by the early educators of modern times, and permeate the writings of the great master teachers.

Education in Europe. The Reformation (q. v.) is the beginning of the great epoch of modern education in Europe. Promoted by Luther, Melanchthon, and Wycliffe, it taught the doctrine of justification by faith alone and the necessity of reading the Bible. This caused the Scriptures to be translated into the modern tongues and gave rise to schools which taught the people to read and write. Ultimately it made possible the great universities, such as those at Oxford, Cambridge, Edinburgh, Berlin, Paris, and Vienna. Among the teachers and writers who influenced educational thought in Europe are Bacon, Comenius, Locke, Francke, Rousseau, Kant, Fichte, Richter, Hegel, Rosenkranz, Herbart, Beneke, Pestalozzi, Froebel, and Spencer. Germany has been rightly named the *land of pedagogy*, and the influence of its great teachers has been felt in every civilized country. Its institutions have long had the highest reputation on account of their excellence for training teachers and inducing education, from the kindergarten system to the colleges and universities.

The education of modern Europe is largely statal, attendance is free and compulsory, and the courses of study cover, not only branches of classic learning, but disseminate knowledge and skill in the arts of industry. The primary schools have been given over entirely to women teachers, while grammar grades, higher instruction, and supervision are limited almost exclusively to men. Institutions and associations of teachers are maintained and exercise influences similar to those in America, while periodicals and books devoted to pedagogy are read extensively. The newer statistics place Sweden in the highest rank among the nations of the world on account of its common school education, illiteracy there being limited to the lowest per cent. It is impossible to speak of all the many excellent qualities of European schools in this article, and it may be sufficient to say that

all the progressive nations of Europe, and, for that matter, of the world, are giving closer attention to the building of schools and the education of the young for the state and for life than in any other period of history.

Education in America. Education has been a profound study in America, though the United States and Canada represent its greatest development and most marked influence. The representative form of government makes it necessary to educate universally, else our civil institutions must fail. The dangers of universal suffrage can be overcome only by universal education. In recognition of this fact legislation along educational lines was early directed to the building of schools and the founding of colleges. Massachusetts led the way in 1632 by requiring all children to be taught to read and write. Later, when the United States was established as an independent government, Congress set aside lands to aid schools, and in the newer states and territories sections sixteen and thirty-six of each township were reserved for that purpose. Normal training schools for teachers are maintained in nearly all the states by public taxation, at which admission is free, and through whose influence a strong profession of teaching is developing. The Commissioner of Education is an important officer of the Federal government, whose influence for good by means of treatises, lectures, and published reports is widening constantly in the entire nation.

The states maintain either State commissioners or superintendents of public instruction, while county superintendents and, in some states, commissioners, have local supervision. Teachers are called to convene in conventions and institutes by proper authorities, and are certificated to teach either by local officials, county superintendents, or State boards of examiners. In most of the states school attendance is nominally compulsory and in all it is free of tuition. Some states maintain free schools devoted to the industries and higher learning, though many of such institutions are aided by the Federal government. Public schools are open and alike free to both sexes, but in a number of Southern States separate schools are maintained for the education of Negro children. Besides the public schools and higher institutions, there are many denominational and private schools, colleges, and universities. Collectively they represent an immense capital and wield a marked influence for good. In states which have compulsory laws, attendance at private schools, which have courses similar to the public institutions, is considered to be in compliance with law. Among the most prominent educators that have exercised a large influence in shaping educational theories we may name Kant, Richter, Hegel, Asa Gray, Herbert Spencer, Herbart, Rousseau, Froebel, Pestalozzi, Horace Mann, Aristotle, Socrates, Plato, Fichte, Rosenkranz, Haeckel, Max Müller, Locke, and Jonathan Edwards, all of whom are treated in special articles. To this list may be added the following American educators of recent date: G. Stanley Hall, W. T. Harris, David Starr Jordan, William R. Harper, Herman Eduard von Holst, Andrew Dickson White, George Payn Quackenbos, Joseph Baldwin, C. W. Eliot, Francis Wayland, W. M. Beardshear, Samuel Eliot, E. E. Brown, Philander P. Claxton, etc.

EDUCATION, Commissioner of, the title of the chief officer of education in some states and countries. The term is applied interchangeably with that of superintendent, though in some states and provinces it is recognized as the exclusive title. It is the duty of a commissioner of education to supervise the general management of schools and public institutions, and to publish recommendations and biennial reports upon the methods of teaching and the management of educational system. In Canada various names are used in speaking of officials who have charge of educational work, such as minister of education, in Toronto; superintendent of education, in Nova Scotia; and commissioner of education, in Saskatchewan.

The Commissioner of Education of the United States is the chief officer of the national Bureau of Education. He is appointed by the President with the consent of the Senate. The duties are to collect educational statistics, diffuse information regarding the organization and management of schools and school systems, to promote the cause of education, and to present annually to Congress a report embodying the result of his investigations and labors. The office was established in 1867 with Henry Barnard as the first commissioner.

EDUCATION, Compulsory, the term applied to the system of education in which attendance is required by the state for some fixed period. Nations have long recognized the importance of training youth for citizenship, hence attendance upon some schools has been compulsory, though in most cases the parent may select the particular school at which the child is to attend, that is, the parent may choose to enroll the pupil in a public school or in a private institution where work of the same kind is done in certain branches. The law varies in fixing the compulsory period, usually beginning with the ages of five to seven years and extending to the ages of fourteen to sixteen years. In a majority of countries the compulsory period is eight years.

Since the state requires all of its citizens to pay taxes toward the support of the schools, it is held reasonable that the citizen should expect all children to get the advantages of an education. Since the safety of society is dependent upon morality and intelligence, it is quite essential to the state that no one should grow up without receiving proper training for the responsibilities of citizenship. Compulsory

attendance laws were in force among the ancient, especially in Sparta and Athens, where training in military affairs and other branches was required. Germany has had a compulsory attendance law for many years, and similar laws are on the statute books of Great Britain, Sweden, Denmark, Switzerland, and France. In the United States and Canada they are enacted by the State or Province, since these countries do not retain supervision over the public schools, but instead delegated this part of the government to the individual states and provinces. Truant officers are provided for by the laws, and such officers are usually appointed by the local boards of education. It is their duty to see that the attendance law is enforced, and parents are subject to a fine where the child is not in attendance in compliance with the law, though they cannot be punished without due trial. The employment of very young children in mines and factories has made it quite necessary that these laws be enforced.

EDUCATIONAL ASSOCIATION, a society of teachers and educators to study methods and promote educational work. Many forms of societies of this kind are maintained. Local organizations are usually made up of the teachers and educators in a particular city or in a county, and these are tributary to the educational association of the State or Province. Societies organized within a city or county usually meet several times each year, while those of a State or Province hold meetings annually, and in these the work is assigned to different departments, such as that of elementary schools, high schools, and institutions of higher learning. In many states teachers are required to attend the meetings, and are paid for their attendance the same as if they were teaching in the schools.

The National Educational Association of the United States was incorporated in the District of Columbia in 1896, when it succeeded the National Teachers' Association, which was organized at Philadelphia, Pa., in 1857. This association meets annually in different parts of the country, and at these meetings prominent educators read papers or lecture upon topics of interest to teachers in the management of schools or the supervision of school systems. A complete report of the proceedings, including the principal papers and lectures, are published for the benefit of the members. This association has had a marked influence upon public instruction, especially by its celebrated report of the Committee of Ten in regard to secondary schools. It consists of seventeen departments and the National Council, the latter being a board which exercises general advisory power. The largest meeting of the association was held at Boston, Mass., in 1903, when 34,983 members were registered.

EDWARD (ĕd'wĕrd), known as the *Elder,* King of England, ascended the throne in 901; died in 925. He was the son of Alfred the Great, whom he succeeded, but his right to succession was disputed by Ethelwald, who was killed in battle in 905. His reign was disturbed by wars against the Danes, but he subdued them and the native opponents as far as the Humber, and was recognized as overlord in the island.

EDWARD, called the *Black Prince,* son of Edward III., born in 1330; died in 1376. He was so named from the color of the armor worn by him. See **Edward III.**

EDWARD, called the *Confessor,* last of the old royal line of Anglo-Saxon kings, born in Oxfordshire, England, about 1004; died Jan. 5, 1066. He obtained possession of the throne in 1042, when he succeeded his half-brother Hardicanute as king. A number of attempts to establish his authority in England were ineffectual, and he lived in Normandy during the period preceding his succession. His reign was marked by the influence of foreigners, who exercised much power over him, and is characterized by many struggles between the court party, or Normans, and the old Anglo-Saxon party, the latter being under the leadership of Earl Godwin and his son Harold. Several wars with the Welsh terminated to his advantage, and foreign invasions were repelled successfully. History places him among the spiritless rulers of England. However, Pope Alexander III. canonized him in 1161. He was succeeded by Harold, son of Earl Godwin, though it is held usually that the old English monarchy perished with him, largely for the reason that his immediate successor ruled only a few months.

EDWARD, surnamed the *Martyr,* King of England, born in 963; died in 979. He was the son of Edgar and succeeded him to the throne in 975. His stepmother Elfrida intrigued against him in favor of her own son Ethelred, but his right was recognized through the powerful influence of Saint Dunstan. He was assassinated through the intrigues of Elfrida.

EDWARD I., King of England, the elder of the two sons of Henry III., born at Westminster, June 16, 1239; died July 7, 1307. In the early struggle between the nobles and his father he sided with the former, but in the war that followed he showed vigorous generalship on the side of the king. When Pope Gregory X. instigated the last of the Crusades, he took part in it and landed at Acre in 1271. On learning of his father's death, he proceeded to France to do homage to the French sovereign, having been proclaimed king immediately after his father's demise, and reached England about two years later. His vigorous policy and great activity caused his reign to rank among the most important in the constitutional history of England. Soon after succeeding to the throne he directed a military expedition against the Welsh, bringing them under subjection after a contest of nearly ten years, the principal events being the death of Prince Llewellyn and the execution of

Prince David. On account of the excessive usury practiced by the Jews, he issued a proclamation in 1290, by the terms of which 16,000 were banished from the kingdom.

The contest for the Scottish crown induced Edward to assert his claims, causing the ten contestants to acknowledge him lord paramount of Scotland. In this way he was enabled to decide upon the rights of the competitors, and gave his decision in favor of John Baliol, in 1292, who swore fealty to him. Baliol soon renounced his allegiance and a war broke out, which resulted in Baliol's surrender and exile. To make peace with the nobles of England, he approved the Great Charter, by virtue of which the people were enabled to determine for themselves the amount of taxes to be levied. In 1297 William Wallace, a Scottish chieftain, collected a large army for the purpose of securing the freedom of Scotland, defeating the English at Stirling, but he was subdued by Edward at the famous battle of Falkirk, and was later executed as a traitor.

To adjust difficulties with Scotland, he prepared a new constitution, in which Scottish representation in the English Parliament was authorized, but the measure was not fully accepted by the Scots. Robert Bruce organized a powerful army in 1306 once more to battle for Scottish independence. Edward started with his army to subdue him, but died at Carlisle while within sight of the country that he had planned to subdue. He is accorded a place in history among the most liberal and enlightened monarchs of his age. The civil service, internal improvements, and rights of the people were extended largely during his reign.

EDWARD II., King of England, son of Edward I., born in Carnarvon, Wales, April 25, 1284; slain Sept. 21, 1327. Being the first heir apparent to the throne of England, he was created Prince of Wales—the first to bear the title. He accompanied the expedition led by his father into Scotland, but returned home soon after and followed a life of vice and contempt, succeeding to the throne in 1307. His reign was influenced by favorites, among them Piers de Gaveston and Hugh le Despenser. The former was left as guardian of the kingdom in 1308, while Edward proceeded to France to conclude a marriage with Isabella, daughter of Philip V. This was so objectionable to the nobles that Gaveston was captured and hanged June 19, 1312. In 1314 Edward invaded Scotland at the head of a large army, but was defeated with great slaughter by Bruce at Bannockburn, by which the Scots became independent. Soon after Despenser began to influence Edward, which greatly weakened him with the nobles. To adjust difficulties with Charles IV., of France, Edward sent his wife thither. Despising both the Despensers and her husband, she landed on the English shore with an army in 1326, defeated the king, and caused the Despensers to be executed. Being compelled to resign the crown, Edward was cast in prison, and soon after was murdered in Berkeley castle.

EDWARD III., King of England, son of Edward II., born at Windsor, Nov. 13, 1312; died Jan. 21, 1377. He was proclaimed king in 1327. The country was governed during his minority by a council of regency, though really by Queen Isabella and her paramour, Roger Mortimer. In 1330 he determined to assume power and accordingly put Mortimer to death, sending his unworthy mother away. Soon after he invaded Scotland to assist Edward Baliol, and defeated the Scots at Halidon Hill. Subsequently he claimed succession of the throne of France through his mother, a sister of Charles IV., and led a powerful expedition against Philip VI., which resulted in many daring exploits. To maintain his army excessive taxes were laid on the people and valuable concessions were made to the nobles. His eldest son, known as the Black Prince, aided materially in conquering large portions of Normandy, and in capturing the city of Calais after a siege of twelve months.

The war was renewed between England and France in 1355, and the following year the Black Prince captured King John of France at Poitiers. Soon after a peace was concluded by which Edward secured many advantages. The next war between France and England terminated disastrously to the latter country, and Edward was obliged to return home. He soon quarreled with Parliament and became at variance with the nobility, and many important functions of the government were assumed by his third son, John of Gaunt. The Black Prince died June 8, 1376, and Edward survived him about one year. His reign was quite successful, being accompanied by reforms in the national judiciary, extension of commerce, and industrial improvements.

EDWARD IV., King of England, son of Richard, Duke of York, born at Rouen, France, April 29, 1441; died April 9, 1483. The contest between the two families of York and Lancaster was in full sway during his minority. At the Battle of Wakefield, in 1460, his father was slain and Edward became the natural head of the Yorkist party. The victory in the Battle of Mortimer's Cross enabled him to enter London, where he was hailed as king. His title to the throne was established by the great Battle of Towton, though Margaret, Queen of Henry VI., kept up a desultory struggle in the north for some time after, which was ended eventually by the capture of her husband. His early popularity was weakened by the marriage to Elizabeth Grey, daughter of Lord Rivers, a Lancastrian, but in the battle that followed he was successful. He gave evidence of cruelty by confining Henry VI. in the Tower until death and by murdering Margaret's son. His extended quarrels with Parliament led to much dissatisfaction, during which he carried on the

government by compelling loans from men of wealth and conducting trade with merchants' ships. In his reign printing and the manufacture of silk were introduced in England.

EDWARD V., King of England, son of Edward IV., born Nov. 4, 1470. He was a lad of thirteen when his father died and with his younger brother, Duke of York, was shut up in the Tower by Richard of Gloucester, who had been appointed protector of the kingdom. The two unfortunate boys were never again seen, and it is believed that they were murdered by the order of the protector. Many attempts have been made to clear him of the suspicion, but all have failed.

EDWARD VI., King of England, son of Henry VIII. and Jane Seymour, born Oct. 12, 1537; died July 6, 1553. Such learned men as Roger Ascham taught him, and when only ten years of age he succeeded his father on the throne under the protectorship of his uncle, Edward Seymour, afterward Duke of Somerset. The latter invaded Scotland for the purpose of compelling Mary Queen of Scots to marry Edward, but he was compelled to return to England on account of the intrigues of the Earl of Seymour, his brother, whom he executed. Later Somerset was beheaded on a charge of treason made largely through the intrigues of Dudley, Earl of Warwick, who also married his son to Lady Jane Grey and induced Edward to make her his successor. It is thought that the death of Edward resulted from the effects of poison. His short reign was marked by many important events, though they were not brought about by his influence, since his death occurred at the early age of sixteen years. Among the events may be named the establishment of Protestantism in England, publication of the "First Prayer-book" of Edward VI., and many reforms in internal and commercial laws.

EDWARD VII., King of Great Britain and Ireland, Emperor of India, eldest son of Prince Albert and Queen Victoria, born Nov. 9, 1841; died May 6, 1910. He was trained by tutors under the supervision of his father, after which he attended the universities of Oxford and Cambridge. He made a visit to the United States and Canada in 1860, and two years later traveled in a number of Asiatic countries, including the Holy Land. In 1863 he married Princess Alexandra of Denmark, a daughter of Christian IX. In 1875 he made a visit to India, and traveled through various parts of Ireland in 1885.



EDWARD VII.

On the death of Queen Victoria, Jan. 22, 1901, he ascended the throne, declaring himself determined to maintain the constitutional form of the government. He was crowned on Aug. 9, 1902.

Edward was a lover of outdoor sports and a leader in the social life of England. He had a high standing in the councils of the Freemasons of England, of which he was elected Grand Master in 1874. His personal acquaintance among the courts was extensive, both in Europe and the East, and he was recognized as a factor in the politics of the world at an early period of his reign. His six children include Albert Victor (1864-1892), Duke of Clarence and Avondale; George Frederick, Ernest Albert, now George V.; Louisa Victoria, the Duchess of Fife; Victoria Alexandria; Maude Charlotte, the Queen of Denmark; and Alexander John, born and died in 1871.

EDWARDS, Amelia Blandford, novelist and Egyptologist, born in London, England, in 1831; died April 5, 1892. She manifested an interest in literature at an early age, and in 1853 became noted as a contributor to several magazines. Her reputation is based largely on her novels and travels, though she produced a number of educational works, these being largely abridgments of French and English history. Her travels extended through Eurasia, Africa, and America, lecturing in the United States and Canada in 1890. Among her principal novels are "In the Days of My Youth," "Half a Million of Money," "Hand and Glove," and "Lord Brackenbury." Her educational and historical works of interest include "A Thousand Miles Up the Nile," "Untrodden Peaks and Unfrequented Valleys," "Pharaohs, Fellahs and Explorers," and "Manual of Egyptian Archaeology."

EDWARDS, Jonathan, philosopher and theologian, born in East Windsor, Conn., Oct. 5, 1703; died March 22, 1758. After securing an elementary education, he entered Yale College, where he graduated in 1720. Subsequently he became tutor at Yale and after a few years was ordained pastor at Northampton, Mass., where he remained until 1750. From 1751 until 1758 he preached as a missionary to the Housatonic Indians at Stockbridge, Mass., after which he succeeded his son-in-law, Aaron Burr, as president of Princeton College. His influence in the thought and life of New England was very marked, and as an original investigator of philosophy he still ranks among the most eminent



JONATHAN EDWARDS.

of America. His personal character was one of refinement and generosity, while in theology he ranked as a rigid Calvinist. He published his famous "Inquiry into the Freedom of the Will" in 1754, which is still regarded as one of the most able productions on the subject of mental science.

EDWY, King of England, son of Edmund I., born about 918; died Oct. 1, 959. He succeeded his uncle Edred in 955. His reign became unpopular because of his opposition to the monasteries, on account of which Saint Dunstan led the papal party in opposition and drove him from the throne of Mercia and Northumberland in 957. He was succeeded by his brother Edgar.

EEL, the name of a class of serpent-shaped fishes found in nearly all rivers and seas of the warmer zones. About fifty species have been described, differing somewhat in form, but all are covered by a soft, thick, slimy skin, some having minute cycloid scales. The gill orifices are very small and are situated far back, by reason of which they can remain out of water a long time. Some species frequent the land by night in search of food. Eels prefer to live in the mud, and in cold weather bury themselves in the muddy bottom or migrate to warm and sluggish waters. They are very sensitive to cold and not found in latitudes beyond 64° 30′ north or south of the Equator. They are particularly abundant near the deltas and estuaries of rivers, where the adults spawn, and in the spring immense numbers of young eels pass up streams and canals, overcoming many obstacles in their progress. They are excellent and nutritious food. The *electric eel* found in the marshy waters of the llanos in South America attains the length of four or five feet and discharges a perceptible current of electricity when it is touched.

EGAN, Maurice Francis, scholar and author, born in Philadelphia, Pa., May 24, 1852. His education was especially designed to fit him for a literary career, having graduated at La Salle College and Georgetown University. He studied law, but soon after engaged in journalism by editing *McGee's Illustrated Weekly.* His observations in extended trips through the southern and western states and Mexico were embodied in letters and articles to magazines. Soon after he became editor of the *Catholic Review.* In 1881 he took charge editorially of the *Freeman's Journal* and in the meantime contributed various articles to "Appleton's Cyclopaedia." For several years he was professor of English literature at Notre Dame University, Indiana, and afterward instructed in the Catholic University of America at Washington, D. C. Among his educational publications are "Essays on English Literature," "Theater and Christian Parents," "Glories of the Catholic Church," "Best Literature of the World," and "Modern Novels and Novelists." Among his novels are "That Girl of Mine," "That Lover of Mine," and "Jack Chumleigh."

EGBERT (ĕg′bĕrt), King of Wessex, considered the first king of the united Anglo-Saxons, born about 775; died in 836. When he succeeded to the throne of Wessex in 802, England was divided into the three kingdoms of Mercia, Northumbria, and Wessex, but after a struggle he made all England dependent on him and was recognized overlord, both of Mercia and Northumbria. He was succeeded by Ethelwulf.

EGG, the cell or ovum and its accompanying products which are extruded from the ovary of females of various animals, containing the germ, origin, or first principle of life. It consists essentially of a single cell of protoplasm, in which rests the potentiality of life of an individual corresponding to the parent stock, but rarely two or more such cells are contained in the egg, when the life product is a deformity or results in more than one offspring. Reproduction in all animals is by eggs, except in the Protozoa, but in some animals the egg is incubated within the body and the new life is brought forth in a more or less immature state. Young produced in this way are said to be *born,* while those developed from eggs outside of the body are said to result from hatching or incubating.

In general the term *egg* is used only in connection with animals that do not produce tneir young alive, in other words, the oviparous animals. The most common oviparous animals include birds, reptiles, fishes, insects, and worms. Eggs usually contain, besides the germ, substances which serve for nourishment of the new life. In animals below the birds, the egg has only three parts, the germ, the germinal vesicle, and the yolk. In the egg of birds, besides these, are a calcareous shell, a tough skin, and a considerable amount of white or albumen. When the young animal is developing, it is nourished first by the albumen and then by the yolk, both of which are consumed before it comes out of the shell.

The eggs of birds and fowls are usually oval, but a few are nearly round. In one end of the egg, between the skin and the albumen, is an air cavity which is thought to facilitate the breathing in the early stages of the new life. The outer covering of the eggs of reptiles and lizards consists of a parchmentlike membrane, while in cartilaginous fishes, such as sharks and rays, the egg is inclosed in a four-sided horny case, with tendrils projecting by which it is moored to floating seaweeds. These, after the escape of the young fish, are washed upon the shores, where they are familiarly known as *mermaid's purses.* Eggs of animals now extinct have been found in Madagascar three feet in circumference, but the ostrich lays the largest egg of any animal now living.

The eggs of birds and fowls are hatched by being kept at a temperature of about 104° Fahr. for a period of from two to four weeks. Crocodiles, alligators, and turtles bury their eggs in the sand, where they are incubated by the heat of the sun or by the warmth of decaying vegetation. Eggs of the turtle are in repute as an article of food and luxury, and those of gulls, guillemots, and wild ducks are much sought by the inhabitants of the Orkney and Shetland islands, as well as Iceland and other northern regions. On the coast of Labrador an extensive business has developed by the eggers, who collect the eggs of sea birds and carry them to the markets of Canada and the United States. Tremendous precipices are braved by men, whom their companions let down by means of ropes to gather the eggs from ledges.

Birds differ greatly in the number of eggs which they lay for a *set* or *clutch,* but in this respect the individuals of the same species are quite uniform. The larger birds of prey and many waterfowl lay only one egg in the year, while others, as the hen, produce a large number. Field and woodland birds, as the robin and crow, usually lay from five to seven, while the titmouse ordinarily deposits about ten. In some instances the color is quite similar to that of the nests, but it includes white, brown, greenish, and variously spotted species. The egg of the hen is the most important as a commercial product. It consists of 73.7 parts water, 13.4 parts protein, and 10.5 parts fat. Other eggs sold on the market are those of the duck, turkey, goose, and guinea. Besides being valuable as food, eggs are used for purifying liquids and the albumen is useful in preparing photographic paper. See **Evolution; Nest; Poultry.**

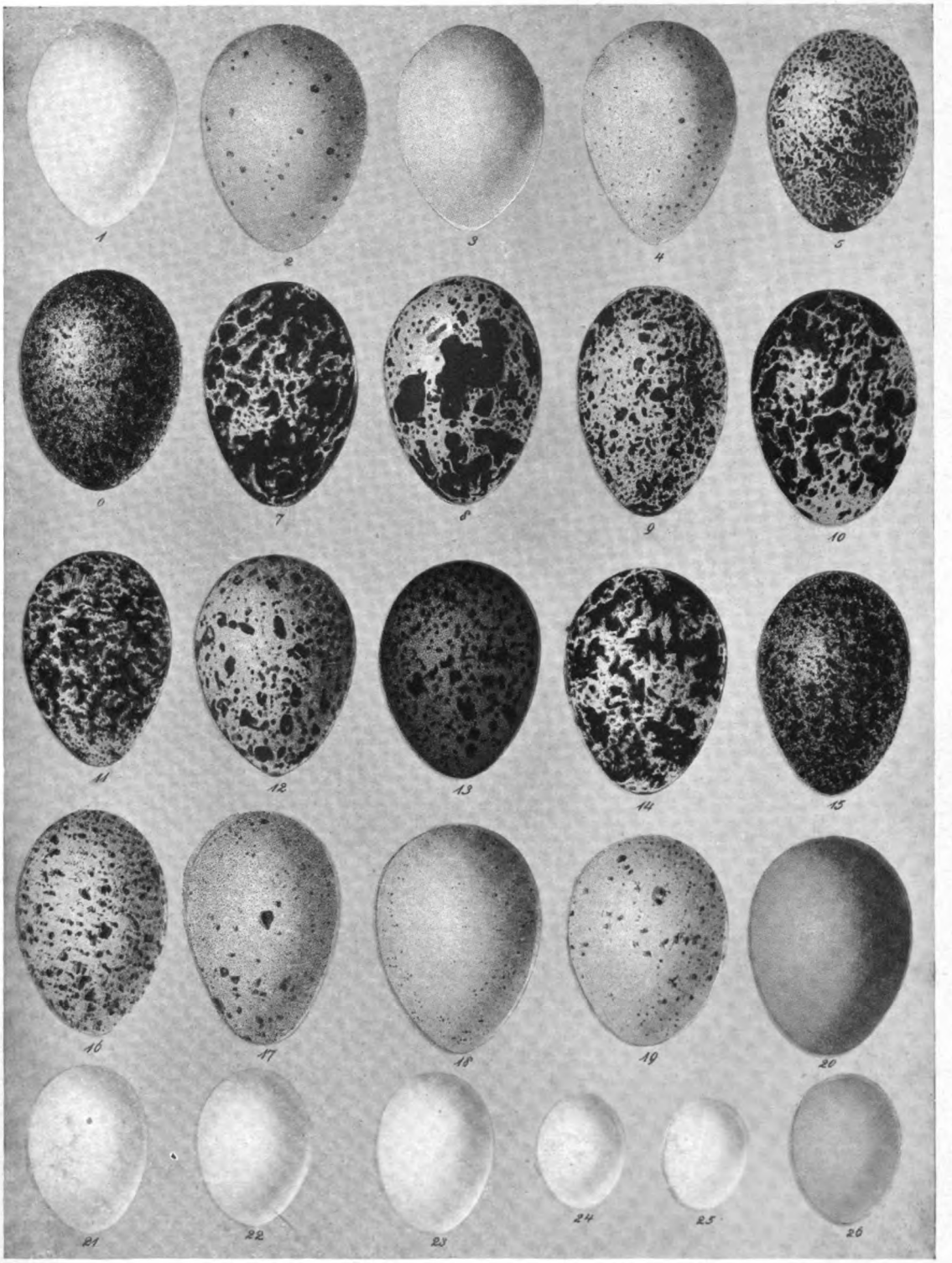
EGGLESTON (ĕg'g'lz-tŭn), **Edward,** author and historian, born in Vevay, Ind., Dec. 10, 1837; died Sept. 3, 1902. His education included a knowledge of French, Latin, and Greek, and he became acquainted with the literature of these languages and of the German, Spanish, and Italian. He entered the Methodist ministry in 1856, and subsequently held pastorates in the Minnesota cities of Saint Peters, Saint Paul, Stillwater, and Winona. In 1866 he became associated with the editorial work on the *Little Corporal,* a publication for children issued at Evanston, Ill., and subsequently edited successively the Chicago *Sunday School Teacher,* New York *Independent,* and *Hearth and Home.* He was pastor of the Church of the Christian Endeavor, Brooklyn, from 1874 to 1879. His novels and historical publications portray a deep power of thought and are read extensively. Among them may be named "The Hoosier School Master," "The Circuit Rider," "The Hoosier School Boy," "The Faith Doctor," "Eighty Famous American Indians," "The End of the World," and "School History of the United States." His most extensive production is "People's Standard History of the United States," a work published in six volumes.

EGGLESTON, George Cary, writer, brother of Edward Eggleston, born in Vevay, Ind., Nov. 26, 1839. He studied at Indiana Asbury University and Richmond College, Virginia, and soon after began the practice of law. Shortly after the beginning of the Civil War, he volunteered and served in the Confederate army, and after the war engaged in journalism in New York. Subsequently he became editor in chief of the *Hearth and Home.* In 1875 he was made literary editor of the *Evening Post* and in 1889 became editorial writer on *The World.* His books include "The Wreck of the Red Bird" "The Juggernaut" and "A Rebel's Recollections." He died April 14, 1911.

EGGPLANT (ĕg'plănt), a plant of the nightshade family, so named because the fruit resembles an egg in shape. It is native to the tropics, but may be grown in the northern portion of the United States and the southern part of Canada, when planted in a hotbed. About a dozen species are cultivated for the fruit, which is cooked in a variety of ways as a table vegetable. The species that yield a purple colored fruit is the best for general use, such as the New York purple and the black Pekin. The plant grows to a height of about two feet, has prickly leaves, and flowers of a violet color. The fruit varies from the size of a hen's egg to specimens from six to eight inches in diameter, depending upon the season and the richness of the soil.

EGINHARD (ā'gĭn-härt), or **Einhard,** the biographer of Charlemagne, born in Austrasia about 770; died March 14, 840. He became associated with the court of the emperor at an early age, was a pupil of Alcuin, and subsequently received an appointment as private secretary and superintendent of public buildings. He accompanied Charlemagne on all his journeys and marches. After the death of the emperor, he erected a monastery at Mülheim, Germany, and gave that place the more appropriate name of Seligenstadt, meaning "City of the Blessed." Among his writings are "Letters," 62 in number, and "Life of Charlemagne." The latter was completed about 820. It is well executed in plan, style, and language, and is considered the most valuable historical production of the Middle Ages. This work has had a wide translation and reading, and has been used extensively as a school text-book in the study of history.

EGMONT (âg-môn'), or **Egmond, Lamoral, Count of,** celebrated Dutch patriot, born in Hainault, Belgium, in 1522; beheaded in Brussels, June 5, 1568. He enlisted in the military service of Charles V., and in 1541 accompanied that monarch on his expedition against Algeria. Later he served with much success



(Opp. 880) EGGS OF BIRDS.

1, 2, 3, 4, Ruffled Grouse; 5; 6, 7, 8, 9, 10, Willow Ptarmigan; 11, 12, 13, 14, 15, Rock Ptarmigan; 16, 17, White-tailed Ptarmigan; 18, 19, 20, Prairie Hen; 21, Zenaida Dove; 22, 23, White-fronted Dove; 24, Mexican Ground Dove; 25, Inca Dove; 26, Ruddy Quail Dove.

in the Battle of Saint Quentin under the banners of Philip of Spain, who appointed him governor of Flanders and Artois. He became popular with the people by forming an alliance with the Protestant party in the Netherlands against the Catholic policy of Philip. It is thought that he sought the friendship of the people rather for the sake of the common good than because of a close adherence to the Protestant religion, but writers generally describe his government as humane and virtuous. The strain of public feeling gradually intensified, and in 1565 he proceeded to Spain to adjust matters with Philip and secure a better understanding of the nature and needs of the administration. On returning to the Netherlands he became at variance with the Prince of Orange, which caused the latter to leave the country. Shortly after the Duke of Alva was sent with an army to reduce the insurgents in the Netherlands, and Egmont vainly tried for some time to gain his confidence. Later Alva seized both him and Count Horn and carried them to the citadel of Ghent. A court tribunal instituted by Alva tried them on a charge of treason and caused them to be beheaded. The people were strongly in sympathy with Egmont, demonstrating much feeling on account of his death, and regarded him a martyr in the cause of freedom. Goethe made Egmont a hero in one of his dramas.

EGOISM (ē'gō-ĭz'm), the doctrine of a class of philosophers, according to which a person can be certain of nothing but his own existence, and that of the operations and ideas of his own mind. As affecting mental sensations, egoists involuntarily regard the body as ego, that is, the being itself; but, so far as cognition is concerned, the body is regarded objective, or non-ego. Egoism, in an ethical sense, is now used as an antonym to altruism (q. v.).

EGRET (ē'grĕt), the name of several species of heron, especially those that have a well-developed crest during the breeding season, and whose back is adorned with long, loose flowing plumes. The American egret is about 37 inches long, measured from the tip of the beak to the end of the tail, and the extent of the wings is 55 inches. The snowy egret, native to the region bordering on the Gulf of Mexico, is a beautiful bird. It is hunted for the sake of the plumes during the breeding season, hence is becoming rapidly exterminated. The reddish egret is remarkable in that some birds of the same species are nearly white while others have a bluish-slate color, and it appears that the differences in color are not dependent upon sex, age, or season. Several species are native to Europe and Asia, including the European and the white heron.

EGYPT (ē'jĭpt), a country of Africa, situated between the Red Sea and the Libyan Desert, and extending from the Mediterranean Sea to the Nubian Desert. It is bounded on the north by the Mediterranean Sea, on the east by Syria and the Red Sea, on the south by a line drawn from the Red Sea to a point about 200 miles west of Wadi Halfa, and on the west by a line drawn from about 200 miles west of Wadi Halfa to the southeastern point of Tripoli, and thence north to the Mediterranean. The southern boundary coincides nearly with the latitude of 22° north. It includes the eastern third of the Libyan Desert. The extent from east to west is about 500 miles and the length north and south is 670 miles. The area of Egypt proper is 394,240 square miles.

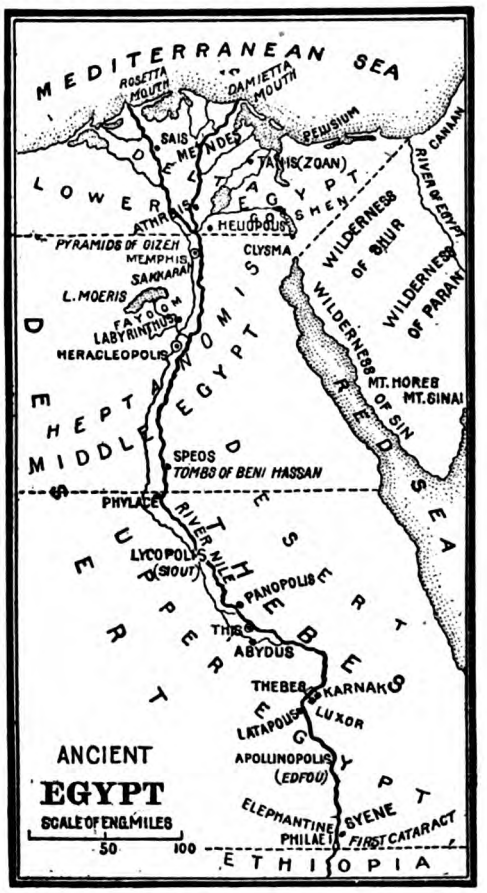


SNOWY EGRET. LITTLE EGRET.

DESCRIPTION. Most of the surface consists of a sandy desert, the cultivated portion being confined to the country more or less affected by the annual inundations of the Nile and the coast plains along the Mediterranean. This fertile region includes only about 10,000 square miles, and contains almost the entire population of the country. The Nile flows through it from south to north, though it has no tributaries within Egypt, owing to the arid condition of the country. West of the Nile are the barren wastes of the Libyan Desert, much of which is elevated only a few hundred feet above the sea, while many small localities are below it and derive their water by infiltration from the Nile. In the eastern part is a region of mountains, extending from Assuan and Berenice in the south to Cairo and Suez in the north. The mountains cover a district about 150 miles wide and are highest near the Red Sea, where their summits approximate 7,000 feet. The country south of Assuan is made up largely of sand plains and desert hills, which form the northern part of the Nubian Desert.

The course of the Nile through Egypt is about 800 miles. A short distance south of Assuan is the First Cataract, the only one in

Egypt, where a great dam is maintained to regulate the supply of water for irrigating purposes. The annual overflow of the Nile has a tendency to fertilize the soil and render it exceedingly productive. Usually the overflow begins the middle of July and is occasioned by excessive falls of rain in the mountains and lake region near the Equator. The irrigated land begins to dry in October and the crops are sown in November, maturing in March, when they are harvested. Southwest of Cairo is a fertile tract, the depressed valley of Fayum, and near its northern extremity is the lake of Birket-el-Kerun. Many of the localities ad-



jacent to the Nile and some of its banks are characterized by masses of rock and broken cliffs. Extensive forests are entirely unknown in the upper valley, but small clusters of trees are found in some localities.

The atmosphere is dry and the sky is clear most of the year. At Cairo the rainfall is less than two inches per year, while at Alexandria, on the coast, it is about eight inches. Near the sea the temperature rarely reaches the freezing point, but the thermometer sometimes registers 114°. In April and May a large part of the country is visited by the khamsin winds, which cause a rapid rise of the temperature and fill the air with dust and sand. The sycamore is the prevailing tree and is rivaled only by the date palm. Many species of trees have been introduced and are cultivated in the regions where moisture is sufficient. The lotus and the durra, the almost extinct papyrus, are Egyptian plants. Fish are abundant in the Nile and off the coasts, and birds and insects are numerous. The fox, jackal, wild ass, leopard, lion, and striped hyena are among the wild animals.

AGRICULTURE. About two-thirds of the people are engaged in agricultural pursuits. Three crops are grown annually in the districts that are well irrigated, this being possible on account of the large amount of organic matter deposited by the waters of the Nile. Clover, wheat, barley, and vegetables grow best from December to March; sugar cane, rice, cotton, millet, and fruit thrive from April to July. The Nile Delta is the richest region and produces most abundantly. Among the tropical fruits are the orange, lemon, and fig, and the grape, pomegranate, apple, plum, and quince thrive in nearly all parts where moisture is sufficient. Raw silk is produced to some extent and tobacco can be grown profitably, but its cultivation is not permitted. The live stock industry is on a profitable basis, and especial attention is given to the rearing of sheep, cattle, and camels. Swine are raised by the Copts, and horses and mules are quite common in the cities.

MINING. Egypt is not rich in mineral wealth, though it is possible that deposits exist which have not been discovered. Gold mines were worked anciently in the rugged mountains of eastern Egypt and some of them have been rediscovered. Salt is obtained in the salt marshes of the Nile Delta and considerable saltpeter is manufactured. Vast deposits of limestone, granite, and sandstone were worked in ancient times, but comparatively little is done in this line at present. The material used in the construction of the great pyramids and many temples was obtained from the granite deposits near Syene, where the supply is inexhaustible.

TRANSPORTATION AND COMMERCE. Alexandria is the chief seat of foreign commerce, being favored by its location on the Mediterranean and a number of important railways. A large trade is carried on at Cairo and other points on the Nile and the Suez Canal. Inland trade is chiefly by caravans, by railways, and by transportation on the Nile, which is navigable the entire distance in Egypt. Many of the highways have been improved and are being maintained by local taxes. The country has 2,500 miles of railways, most of which are owned by the government. The Cape-to-Cairo Railroad is the most important line and will furnish transportation facilities to Cape Town. Tele-

phones are utilized in the cities and many rural districts, and all of the principal trade centers have telegraph communications. Great Britain has the largest share of foreign trade, and next in order are Turkey, France, Germany, Austria, Italy, and the United States.

The weaving of fez and linen is an ancient industry, but modern customs in dress have caused it to decline. Sugar is manufactured quite extensively by the employment of foreign capital, and Egypt is an exporter of that product. Other manufactures include cotton and woolen goods, cigarettes, clothing, utensils and machinery of different kinds. Cotton, cotton seed, meat, hides, and fruit are the chief exports, while coal, wood, textiles, and metal products are imported.

GOVERNMENT. The government is a form of monarchy, tributary to Turkey, and the chief executive is the Khedive or Governor General. He is assisted by six ministers in the administration of government, those of justice, interior, finance, war, foreign affairs, and public works and public instruction. France formerly exercised the greatest influence politically, but since the rebellion of Arabi Pasha the predominant influence has passed to England and the public defenses are under the control of that country. Local conditions are such that internal improvements have been going forward and trade relations have been enlarged materially within the last two years. The legislative power is vested jointly in the legislative council and the general assembly. Local government is administered by six governorships and fourteen provinces.

INHABITANTS. Native Egyptians comprise the greater part of the inhabitants, but a majority of these are known as fellahs, who comprise the lower class. The people in the smaller towns are wholly Egyptians, while the larger cities contain many foreigners. Among the foreign inhabitants are the Arabs, Greeks, Italians, British, French, Germans, and Persians. Nearly all of the Mohammedans are of the Sunnite faith, constituting about 92 per cent. of the entire population. Next in order of number are the Christians, chiefly Copts, and Jews. Cairo, the capital, is located on the Nile in lower Egypt. Alexandria is on the Mediterranean and Port Said is the chief town on the Suez Canal. Other cities include Rosetta, Damietta, Suez, Tanta, Assiut, Gizeh, and Mansourah. The total population in 1912 was 11,390,593, which included 111,680 foreigners.

LANGUAGE AND LITERATURE. Comparatively little is known in regard to the origin of the language spoken by the ancient Egyptians. It showed some affinity to the Semitic languages, but as a whole was quite distinct in its general construction. The history of the language is divided usually into four periods, including those in which prevailed the four systems of writing known as the hieroglyphic, hieratic, demotic, and Coptic. It is not known when the *hieroglyphic* system of writing originated, but there is an abundance of evidence that it prevailed extensively as early as 3000 B. C. The *hieratic* writings are those of the priests or sacerdotal class, while the *demotic,* a popular form of hieratic writing, came into literary use about the 7th century B. C. Greek letters were used frequently to write demotic words and later Semitic forms came to be added, thus giving rise to the *Coptic* language, the latest form of the Egyptian. At present it is employed only in the liturgy of the Coptic Church, and in its stead the Arabic is now in common use.

Though the Egyptian language underwent marked changes, there is a notable similarity in the literature of the different periods. In the epoch of history included in the reign of the Rameses inventive genius was especially encouraged, particularly such talent as led to the production of novels and works of amusement. However, by far the most important writings are of a historical character, especially in the time of the Ptolemies, when the lore of the East was energized by western scholars, particularly by the Greeks. The works in religion are numerous, especially in the Coptic period, when church rituals, homilies, and other Christian literature were introduced.

Among the Egyptian writings is an interesting work entitled "Book of the Dead," a copy of which was found in a tomb of a queen of the 11th dynasty, which is thought to date from about 3000 B. C. It contains an account of the adventures of the soul after death, and gives directions by which it is possible to reach the hall of Osiris. The writings on astrology, moral philosophy, agriculture, medicine, physics, economics, ethics, mathematics, and poetry are numerous. A work on geometry, entitled "The Principle of Arriving at the Knowledge of Quantities," dates from about 1100 B. C. Euclid, the Greek mathematician, who flourished at Alexandria about 300 B. C., gave impetus to mathematical research and wrote his "Elements of Geometry," a work still recognized as authoritative. "The Romance of Setna," written about the 3d century B. C., and "The Tale of Two Brothers," probably written about the time of the exodus, are two works in story form. Many writings are in the form of epistolary letters and epic poetry. In the "Epic of Pentaur" are described the events connected with the war conducted by Rameses II. against the Kheta.



ANCIENT STATUE.

HISTORY. No country contains greater wonders of remote antiquity than Egypt. The Sphinx and pyramids are remarkable for their great size and wonderful endurance through the centuries. When Napoleon and his legions reached the vicinity of these relics, he was led to exclaim, "Soldiers, forty centuries look down upon you." The catacombs and labyrinth of Upper Egypt are likewise remarkable curiosities. The labyrinth is partly under ground, cut out of marble, and originally consisted of twelve palaces and 3,000 chambers. Anciently the Egyptians possessed a wonderful civilization, and built vast palaces, monuments, and canals. They were superior as scholars and statesmen. On many of the ancient ruins are forms of hieroglyphic writings from which we have learned much of their system of mathematics, astronomy, architecture, and religion, and of their utensils, machinery, costumes, and implements of war. Their commerce was among the most extensive of the ancient world, and their civil institutions ranked with the best. Modern Egypt is but the shadow, the ruins, of a once powerful civilization.

Egypt has a history extending back, according to different writers, to the year 3892 B. C., though some writers of profane history place its beginning about the year 5004 B. C. The priest Manetho arranged and published, in 250 B. C., a list of thirty Egyptian dynasties, and this record is still considered the best extant. In the reign of the fourth dynasty the great pyramids were built, the largest by the three kings, Cheops, Chephren, and Mykerinos—according to Lepsius, the German philologist and Egyptologist, within about the period of 2800-2700 B. C. The Pharaohs ruled the country until the Egyptians were conquered in 520 B. C. by Cambyses, King of Persia. It is thought Rameses II. was the Pharaoh who oppressed the Israelites, and that the exodus occurred in the time of his successor, Merneptah. The country was subject to Persia until Darius was vanquished by Alexander the Great, which occurred in 322 B. C.

After Alexander's time Egypt passed to the Ptolemies, becoming under them and Greek influence one of the most progressive kingdoms. The Ptolemies controlled it nearly 300 years, after which it was made a Roman province and was held by them about 650 years. In 337 A. D. it became a part of the Eastern Empire, but the Romans were finally expelled by the Saracens under Caliph Omar in 640 A. D. The last dynasty of the Saracens was overthrown by the Mamelukes in 1250, who held the supreme power more than two centuries, but they were subjugated by the Turks in 1517 under Selim I., the Ottoman Sultan.

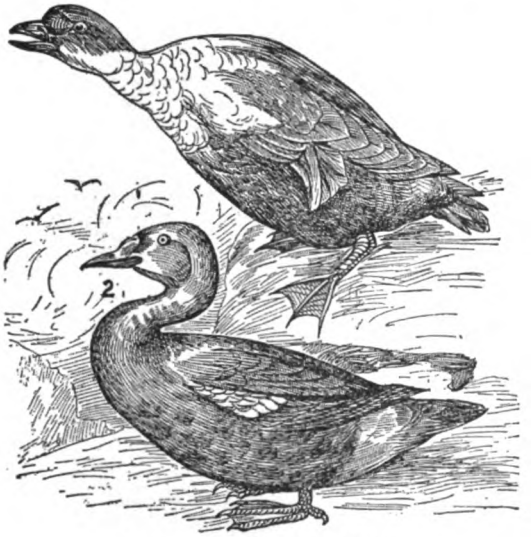
Napoleon I. conquered Egypt for France in 1798, though his army was driven out by the British and the country returned to Turkish rule in 1801. Mohammed Ali became pasha in 1805, after completely vanquishing the Mameluke chiefs, and introduced the elements of European civilization. He was succeeded by Said Pasha, during whose reign the French engineer, M. de Lesseps, commenced the Suez Canal, which was opened in 1869. Within recent years both the French and the English have sought to enlarge their influence in Egypt. The latter under General Kitchener defeated the dervishes in the Battle of Omdurman in 1898, while Fashoda was occupied by the French, on account of which complications arose between the two nations, but all differences were settled by arbitration on Jan. 9, 1899. The terms of the treaty place a portion of the Egyptian Sudan district under the English and a portion under the French. The British declared a protectorate over Egypt in 1914, shortly after the Great European War began, and attempts of Turkey and her allies to dislodge them proved futile.

EGYPTOLOGY (ē-jĭp-tŏl'ō-jў), the study of Egyptian antiquities. The object of this branch of learning is to investigate the early life, language, customs, and achievements of the people of ancient Egypt. The study was induced largely by the discovery of the famous Rosetta stone by M. Boussard, a captain of Napoleon's army, in 1799. This stone contains a proclamation written in hieroglyphics, and is the key by which many of the inscriptions on Egyptian monuments may be deciphered ultimately. In 1883 a society was formed to explore the ancient temples and tombs, its object being to make historical investigations for the purpose of endeavoring to ascertain the history of the sojourn and exodus of the Israelites. The society has been able to enrich many of the museums of Europe and America with valuable specimens, and several works have been published in which descriptions and maps are given of many important ruins and relics of the Nile between Assuan and Cairo.

EHRENBREITSTEIN (å-rẹn-brīt'stīn), a town and important fortress of Rhenish Prussia, Germany, situated opposite the confluence of the Moselle with the Rhine, and connected with Coblenz by a railroad viaduct and a pontoon bridge. It is built on a precipitous rock 387 feet above the river and is inaccessible from three sides. The fortifications were begun in the latter part of the 17th century, but were destroyed by the French. They were rebuilt in 1816-26 at a cost of $6,000,000. The fortress has ample accommodation for 14,000 men and capacity for storing provisions sufficient to maintain an army of 60,000 for a year. The town is unimportant and has a population of 6,500.

EIDER DUCK (ī'dẽr), a species of duck which is nearly twice the size of the common duck. It inhabits the rocky shores and islands of America and Europe. The male is black and white spotted, while the female has reddish-drab colors mixed with black, and white bands

on the wings. This species of aquatic birds subsists on insects, shellfish, small fish, and tender shoots of plants. The eggs are gathered by eggers for the market, while the down from the breast of the female is the well-known eider down of commerce. This down is used by the female to line its nest and cover the eggs. It is useful for its superior warmth and elas-



KING EIDER; 2, EIDER DUCK.

ticity in making beds and coverlets. In the districts of Iceland and Norway, where these birds abound in great numbers, they are guarded as valuable property. The *king eider* is an allied species, resembles the eider duck, and inhabits the same regions.

EIFFEL (ĕf-fĕl′), **Gustave,** noted engineer, born in Dijon, France, Dec. 13, 1832. After securing a general education, he studied at the Paris Central School of Arts and Manufactures, and first attracted attention by using the compressed air method of sinking foundation cylinders in the construction of the Bordeaux bridge. Soon after he erected the Garabit viaduct, the framework of Bartholdi's statue of "Liberty Enlightening the World," and numerous other works requiring more than ordinary skill. His greatest engineering enterprise was the construction of the Eiffel Tower, on the Champ-de-Mars, in Paris, which was completed March 31, 1889, for the Paris Exposition. The total height of the tower is 984 feet and the weight of iron used in its construction aggregates 7,325 tons. At a point 896 feet above the surface it has a diameter of 33 feet. Persons may be carried to the top by a system of elevators. The cost was about $1,000,000, one-third of which was voted by the government, and the balance was paid by the builder with the condition that he might collect admission fees for twenty years after its completion to repay himself. He was made an officer of the Legion of Honor. In 1893 he became connected with the Panama scandal, was convicted of misappropriating funds, and was fined, but the sentence was annulled by the Court of Cassation.

EIGHT-HOUR DAY, the term applied to what has been proposed as the ideal working day by trade and labor unions. It was first made an issue in England in 1833, and trade unions advocated it with more or less vigor in public meetings subsequent to that time. In 1869 a congress of tradesmen held at Birmingham passed a resolution which demanded the adoption of the eight-hour day in Great Britain. The issue was taken up by the National Labor Union of the United States in 1866, and it became the theme of much discussion in all sections of the country, especially after the strikes of 1872. It was put into effect by the national government at the navy yard in 1869, and it is now the working day in all departments of the government. Nearly all the states have recognized it, either in part or all of the branches of work, and it is the common working day in all the mines and many other industrial enterprises. The socialists of Europe have made it an issue and secured its adoption more or less completely in a number of countries, but it is more completely in force in Germany than in the other nations of Europe. New Zealand and Australia have made notable progress in legalizing the eight-hour day. The movement to adopt it has large elements of strength in Canada, where it has been in vogue in most of the mining and a number of other industries.

EISENACH (ī′sẹn-äk), a city of Saxe-Weimar, Germany, situated on the northwestern limit of the Thuringian Forest. It is celebrated on account of the castle of Wartburg, which was built in 1067 on an elevation 600 feet above the site of the city. Luther occupied the castle as an asylum for ten months, in 1521-22, in accordance with the wishes of the elector of Saxony, remaining there for nearly a year after May, 1521. Visitors are still shown the chapel in which Luther preached, the chamber he occupied, and the point struck by the inkstand thrown at the head of the Evil One. The city has well-paved streets, statues of Luther and Sebastian Bach, and a palace erected in 1742. Among the churches are those dedicated to Saint Nicholas and Saint George. The manufactures include woolen, cotton, and linen goods, carpets, machinery, leather, soap, and meerschaum pipe bowls. It has electric street railways, municipal waterworks, and stone and asphalt paving. Population, 1915, 35,153.

EISLEBEN (īs′lā-bẹn), a city of Prussian Saxony, Germany, about 25 miles northwest of Merseburg. It is celebrated as the place where Luther was born and where he died. The city contains numerous memorials of Luther, a fine

bronze statue erected to his honor in 1883, and the house in which he was born, the latter having been consumed partly by fire, though it is still preserved with studious care. The noteworthy buildings include the Church of Saint Andrew, in which are many memorials of Luther and Melanchthon. Eisleben has railway and electric railway facilities and considerable trade. Copper is mined in the vicinity. It has belonged to Prussia since 1815. Population, 1915, 25,121.

EKATERINBURG (yĕ-kà-tyĕ-rĕn-bo͝ork′), a fortified city of Russia, in the province of Perm, 180 miles southeast of Perm. It is located on the Isset River, near the eastern slope of the Ural Mountains, and is surrounded by a productive mining region. The trade is chiefly in iron, cattle, tallow, and cereals. A branch connects it with Cheliabinsk, on the Trans-Siberian Railway, giving it good transportation facilities. It has a public museum of mineralogy, a government mint, a chemical laboratory, and a number of schools and churches. The public utilities include electric lights, waterworks, and electric railways. Peter the Great founded the city in 1722 and it was named after Catherine I., Empress of Russia. Population, 1916, 62,503.

EKATERINODAR (yĕ-kà-tyĕ-rĕ-na-där′), a city of Russia, capital of the Kuban territory, 950 miles south of Moscow. It is located on the Kuban River, about 100 miles from its mouth, and is surrounded by a low and swampy region. The streets are regularly platted, but are not well improved by draining and sewerage. The chief buildings include a cathedral, a museum of natural history, and several government buildings. It has a considerable trade in cattle and cereals and is the seat of annual fairs. Cossacks founded the city in 1794 and named it in honor of Catherine II. Population, 1906, 68,704; in 1911, 157,023.

ELAM (ē′lăm), an ancient country of Asia, known by the Greeks as Susiana and Cissia. It comprised the great plain east of the lower Tigris and included the Zagros and Pushti mountains. The country formed a part of the ancient Persian Empire. Susa or Shushan was its chief city. It appears from the cuneiform inscriptions that Babylon and Assyria were conquered by a king of Elam about 230 B. C., but the Babylonians subsequently captured Susa. In 694 the Elamites overran Assyria and humiliated Sennacherib, and many of the Assyrians were carried away in captivity. Elam was conquered and Susa was razed to the ground in 642 B. C., when many of their valuable books and images were carried away to Nineveh.

ELAND (ē′lạnd), a species of antelope found in South Africa. Livingstone speaks of it as the most magnificent of all antelopes. It more nearly resembles cattle than other species of antelopes, having a broader muzzle, heavier limbs, and a greater bulkiness of form than the common antelope. The height at the shoulders is about five feet and the weight is from 700 to 900 pounds. The horns are two feet long, extending backward and outward, and the face has a gentle and ovine expression. Large herds formerly frequented the fertile hills and



ELAND.

low plains, but European settlements have diminished very materially their numbers. They are hunted for their flesh and hide, both being highly esteemed in the market.

ELASTICITY (ē-lăs-tĭc′ĭ-tў), that property of matter by which it resists change of shape, and returns to its original form when the distorting force is withdrawn. If a body completely recovers its original volume the instant the stress is removed, its elasticity is perfect. Air and all gases as well as water and all liquids are perfectly elastic. Solids do not act this way, and their elasticity of shape is not perfect. For example, glass might be expected to be perfect, but experience proves that it is not, showing a notable degree of imperfection in the torsional elasticity of glass fibers. On the contrary, in copper, brass, soft iron, steel, and platinum, providing the distortion does not exceed a certain limit, the elasticity of shape is much more perfect than in glass. If the strain is too great, the body either breaks or receives a permanent bend. The elasticity of water was proved by John Canton (1718-1772) in 1762. Elasticity in gases is measured usually by the height of a column of mercury they sustain. The term *compressibility* is used frequently in connection with elasticity of volume, and *rigidity* is employed in reference to the change of shape.

ELBA (ĕl′bà), an island belonging to Italy, situated in the Mediterranean, six miles from the mainland, and separated from it by the Strait of Piombino. It is eighteen miles long and varies from three to eleven miles in breadth. It is traversed by a mountain range, the highest elevation being 3,500 feet above the sea level. The coast is rugged and precipitous, the mountains are bare, and the valleys and lowlands produce fruit, wheat, Indian corn, vegetables, and watermelons. Domestic animals common to the continent abound. Iron of

an excellent quality, associated with granite and marble, forms a mountain two miles in circumference and 500 feet high. The island is famous in history for having been Napoleon's place of exile from May 4, 1814, till Feb. 26, 1815. Porto Ferrajo is the capital. Population, 1916, 24,515.

ELBE (ĕl'bę), an important river of Europe, rises in the Riesengebirge of northern Bohemia, near the frontier of Prussian Silesia. It is navigable for seagoing vessels from its mouth to Hamburg, about 85 miles, and for smaller vessels a distance of 525 miles. The total length is 725 miles. An extensive system of canals connects it with numerous points of commercial interest. Among its principal tributaries are the Havel, Mulde, Moldau, Saale, and Eger. The general course through Germany is northwest and the mouth is at Cuxhaven, where its waters flow into the North Sea. Its extensive estuary is obstructed by numerous shoals and islands. It ranks as an important waterway and is rich in valuable fish. Since July 1, 1870, the navigation has been free to commerce from Melnik, Bohemia, to Hamburg.

ELBERFELD (ĕl-bĕr-fĕlt'), a city in Rhenisn Prussia, Germany, about fifteen miles east of Düsseldorf, on the Wupper, a small tributary of the Rhine. It ranks as one of the leading commercial centers of the empire, owing to its extensive trade and manufactures, and has communication by electric and steam railway lines. Among the noteworthy buildings are the courthouse, the city hall, the public library, and the normal school. It has a fine public park and many monuments dedicated to prominent men. The manufactures include clothing, machinery, paper, ironware, and cotton, woolen, and silk goods. Large exportations of ribbons, tape, buttons, laces, carpets, and musical instruments are made. Among its numerous dyeworks are the celebrated Turkey red, which has given the city a reputation in the markets of the world. The city is a center of much wealth and has many modern improvements. Population, 1905, 162,853; in 1910, 170,118.

ELBING (ĕl'bĭng), a seaport city of West Prussia, Germany, on the Elbing River, near its confluence with the Frisches Haff. It is connected with the Nogat by a canal, has good railroad facilities, and is the focus of several interurban railways. Among its noted buildings are the city hall, the gymnasium, and the public library of 35,000 volumes. The manufactures consist chiefly of cotton, linen, and woolen goods, soap, leather, clothing, beverages, and machinery. It is the seat of the Schichau shipbuilding works. Elbing dates from the 13th century and was long an important member of the Hanseatic League. It has belonged to Prussia since 1772. Population, 1910, 58,631.

ELBURZ (ĕl'bo͝orz), a mountain range of northern Persia, trending parallel to the southern coast of the Caspian Sea. The average height of the peaks is from 5,000 to 8,000 feet, while the culminating peak, Mount Demavend, is 18,600 feet. Mount Demavend is a famous volcano. A short distance southwest of it is Teheran, the capital of Persia.

EL CANEY (ĕl kä'nå-ē), **Battle of,** an engagement of the Spanish-American War, which occurred on July 1, 1898. The Spaniards had a force of 520 men at the town of El Caney, about four miles from Santiago de Cuba, and were commanded by Gen. Vara del Rey. General Lawton with 4,500 Americans made the attack and met with desperate resistance, but the Spaniards were defeated. The Americans lost 423 men and the Spaniards lost about 400, including 100 prisoners.

ELDER (ĕl'dĕr), a large shrub or tree found in both hemispheres, including several species. Most species have pinnate leaves and a small creamy-white flower, which clusters in terminal cymes, usually appearing in June. The berries are nearly black and are used to make a kind of wine. They are considered wholesome food, especially in the form of pies and jellies. The wood of the tree is yellowish, takes a fine polish, and is used in making mathematical instruments. Young shoots of the elder have a very large pith, which, when pushed out with a rod, leaves a hollow cylinder and in this form are used by boys in making popguns. The pith, being very light, is employed for various electrical experiments.

ELDON (ĕl'dŭn), **Baron,** statesman, sometimes spoken of as John Scott, born in Newcastle, England, June 4, 1751; died Jan. 13, 1838. He descended from respectable parents, was educated in the Newcastle grammar school and at Oxford University, after which he studied law and attained much success as an advocate. In 1783 he entered the House of Commons and was knighted. He was appointed solicitor-general in 1788 and five years later was made attorney-general. In 1799 he became chief justice of the court of common pleas, subsequently entered the House of Lords as Baron Eldon, and soon after became lord chancellor, which position he held for nearly 26 years. George IV. raised him to the dignity of an earl in 1821. He is mentioned as a man of prepossessing appearance, winning manners, and a supporter of Tory principles. The accuracy with which his name is often associated it due largely to the time required by him to make a decision, his critics often charging that the delay taken for consideration proved of greater harm than an adverse judgment could possibly be. As a reformer he is of little note, while his ardent opposition to certain religious works often caused delays and dissatisfaction. During his long period of office he amassed a fortune estimated at fully $2,500,000.

EL DORADO (ĕl dŏ-rä'dŏ), meaning the golden or gilded land, a term used by the Spanish conquerors of America to describe a coun-

try which they imagined to exist. Their vivid imaginations were stimulated largely by the successes in Mexico and stories told them by natives. Among the incidents of interest is the one connected with the vain attempt of Ponce de Leon to find a spring in the new world that would confer perpetual youth upon all who partook of its waters. Another is the story of fabulous riches reported by Orellana, a Spanish officer of Pizarro, after sailing down the Amazon in 1540. These stories inspired many Spaniards to enter upon voyages, and thereby stimulated the discoveries and settlements of many regions. Sir Walter Raleigh imitated the Spaniards by twice visiting Guiana in search of fabulous riches. El Dorado is the poetic name applied to a country which Orellana pretended he had discovered between the Orinoco and Amazon rivers. To this region he attached accounts of immense quantities of precious metals that he claimed to have discovered, and vividly described a city called Manoa, which he represented as the capital of that country.

ELDORADO, a city of Kansas, county seat of Butler County, 135 miles southwest of Topeka, on the Santa Fé and the Missouri Pacific railroads. It is situated on the Walnut River and is surrounded by a fertile farming and dairying country. The industries include flour mills, carriage works, limestone quarries, and machine shops. It has electric lights, a number of fine schools, and several county buildings. The first settlement on its site was made in 1858 and it was incorporated in 1870. Population, 1904, 3,665; in 1910, 3,129.

ELECAMPANE (ĕl-ē-kăm-pān′), a plant closely allied to the aster, native to Europe, and naturalized in various parts of North America. It attains a height of three or four feet, has root leaves about two feet long, and bears large yellow flowers. The root has an agreeable aromatic odor when dried, somewhat like that of camphor, and is used in medicine as a tonic and stimulant, especially in chronic diseases of the lungs. Several species are cultivated in gardens for their orange-colored flowers.

ELECTION (ē-lĕk′shŭn), the act or proceeding of selecting a person or persons for office, especially if done at a meeting in which the voting is by ballot. In the United States, Congress has power to fix the time for electing all Federal officers, except the President and Vice President. These two officers are chosen under a direct provision of the Constitution, by virtue of which the different states appoint electors under laws enacted by the legislatures of the several states. All general elections are governed by the laws of the states and electors are admitted to vote by State authority, subject to certain constitutional restrictions. In most of the states the right of suffrage is extended to any male citizen of the age of 21 years who has been a resident of the State, county, and election precinct for the period required by law, except those under sentence of imprisonment in the penitentiary and idiots. In certain states paupers are excluded. The right of suffrage has been extended in some states to women in school elections and elections to create bonded indebtedness, while in several the full right of suffrage has been accorded to them. Registration laws requiring voters to register their names and addresses a limited time before election day are in force in many states, but in some they apply only to the elections held in cities of a limited class.

The right to vote comes from the State, the power to abridge or extend voting privileges being vested in the Legislature. Naturalization as a citizen of the United States can take place only under Federal law. The right to vote at all elections has been extended to aliens who have declared their intention to become citizens in nearly half of the states, and they thus enjoy equal voting privileges with citizens of the nation. However, citizens of the United States are the only individuals who may vote in some of the states. The Federal naturalization laws provide that an alien may be naturalized only after five years' residence; this applies alike to all the nation. A limited educational qualification, such as ability to read and write, is required in a number of states, while a property qualification is provided for only in Rhode Island. The 15th amendment to the Constitution, adopted March 30, 1870, extends full suffrage to Negroes. The Australian ballot system, a favorite system of voting, has been adopted in a more or less modified form in most of the states.

In Canada the constitution provides that the government shall be similar in principle to that of the United Kingdom. The members of the House of Commons, who are the highest officers chosen directly by the people, are elected for five years, unless that body is sooner dissolved. They are dependent for their election upon the constituencies in the provinces, by which the franchises are controlled. The voting is by ballot, but the qualifications for voting at the elections vary in the several provinces.

ELECTIVE COURSES (ē-lĕk′tĭv), the term applied in American schools and colleges to the courses of study that may be chosen by undergraduate students. Formerly all students were required to pursue certain courses of study, but this plan has been supplanted in most of the institutions of higher learning. At present only a few institutions adhere absolutely to a required curriculum, and students are accorded the privilege of directing their studies along special lines or in accord with their inclination. However, the courses are divided into groups so each student must select certain studies from each group under the advice of members of the faculty. This arrangement avoids the danger of students selecting work that may be classed as one-sided, or regarded as unsuitable for the

symmetrical development of the mental faculties. Harvard University, one of the older institutions, was a leader in the movement toward establishing elective studies and elective courses. At present nearly all of the State universities are conducted on this plan, while most of the institutions where it has not been fully adopted are giving at least some choice to students in the selection of particular studies.

ELECTOR (ē-lĕk'tẽr), or **Prince Elector,** the title of those princes who had the privilege of electing the Emperor of Germany. This title was established in 1256, when there were seven electors, those of Saxony, Cologne, Bohemia, Mentz, Treves, Brandenburg, and the Palatine. Later the electoral dignity was transferred from Palatine to Bavaria, but it was restored to the former in 1648, hence there were eight electors. In 1692 the number was increased to ten, but the office became obsolete on the dissolution of the Holy Roman Empire, in 1806. The term *elector* is applied to each of the persons chosen to elect the President of the United States. See **Electoral College.**

ELECTORAL COLLEGE (ē-lĕk'tẽr-ąl), the body of men chosen by the people of the several states to elect the President and Vice President. The college is constituted of the entire body of electors chosen by the different states. Each State is entitled to select a number of electors equal to the whole number of members sent to both houses of Congress. Any person holding the office of Senator, Representative, or other position of trust or profit under the United States cannot serve as an elector. The first Tuesday after the first Monday in November is the day fixed by law of Congress for choosing electors. The electors of each State meet in the respective State capitals on the second Monday in January next after they are chosen for the purpose of casting their ballots for President and Vice President.

No discussion of the merits of the candidates takes place, the electors voting for the particular persons previously placed in nomination by conventions called for that purpose. This is a perversion of the intention of the authors of the Constitution, since they were originally intended to cast their votes according to their own judgment. In casting the ballots, electors are required to vote for candidates, one of whom, at least, shall not be an inhabitant of the same State with themselves. Lists of persons voted for at each capital are made, signed, and certified by the electors and transmitted to the seat of government of the United States, each list being directed to the President of the Senate. By law of Congress three certificates of all the votes given are carefully prepared, of which one is delivered in person to the president of the Senate at the seat of government, a second is sent to him by mail, and a third is delivered to the judge of the district court in the district in which the electors assemble.

At a joint meeting of both houses of Congress held on the second Wednesday of February following the reception of the certificates, the reports are opened by the president of the Senate and canvassed in the presence of both houses. The persons having the greatest number of votes for President and Vice President are declared elected, but, if no candidate has a majority, the members of the House of Representatives choose the President by ballot from the three who received the greatest number of votes in the electoral college, each State being entitled to one vote, while the Senate chooses the Vice President in a similar manner. John Q. Adams was elected President by the House of Representatives in 1828, and R. M. Johnson was chosen Vice President by the Senate in 1837.

ELECTORAL COMMISSION, a commission appointed by an act of Congress, Jan. 29, 1877, to investigate certain alleged frauds regarding the electoral votes of Oregon, Florida, Louisiana, and South Carolina in the presidential election of 1876. The appointment of a commission in relation to the election has been deemed unconstitutional by a number of able jurists. Tilden and Hayes were the respective Democratic and Republican candidates for President. The commission consisted of five representatives, five senators, and five associate judges of the Supreme Court. It was constituted of the following: George F. Edmunds, Oliver P. Morton, Frederick T. Frelinghuysen, Thomas F. Bayard, Allen G. Thurman, Henry B. Payne, Eppa Hunton, Josiah G. Abbott, James A. Garfield, George F. Hoar, Nathan Clifford, William Strong, Samuel F. Miller, Stephen J. Field, and Joseph P. Bradley. Much political spirit was shown in the sessions of the commission. On February 27 the Presidency was given to Hayes by a strict party vote of eight to seven, and on March 2, 1877, the commission adjourned. The House voted to reject, the Senate to accept the findings of the commission, but on a concurrent session of both houses it was finally approved.

ELECTRIC BATTERY. See **Galvanic Battery.**

ELECTRIC CLOCK. See **Clock.**

ELECTRIC FISH (ē-lĕk'trĭk), the popular name of a fish that has the power of giving sensible shocks of electricity when touched with the hand. About fifty species of marine animals have this power. A fresh-water eel of South America is the most powerful of these animals in this respect. The body is from five to eight feet long, blackish in color, and about the same thickness throughout. Little is known in regard to its generation of electricity, but it is certain that this force is used in killing fish for food. The electric organs are intimately connected with the nervous system. The torpedo, a member of the ray family, is an electric fish found off the Atlantic coast of North America. A catfish common to the Nile, known as the raash,

is about four feet long, and gives an electric shock about equal to that of a Leyden jar.

ELECTRIC GENERATOR. See **Dynamo.**

ELECTRIC HEATING, a system of artificial heating by converting electricity into heat. The essential principle of an electric heater is that the temperature of a conductor which offers great resistance is raised by passing through it a current of electricity. Such a heater is made by constructing coils or circuits of some refractory metal, which are surrounded by air or some insulating material, and the heat is thrown off by means of a metallic box or radiator. When a current is passed through such a device, it heats the coils by meeting resistance, and the heat is carried off by the radiator. Another system is to pass the current through broad strips or plates of metal, which are covered by an enamel, the latter serving to carry off the heat generated, while the current passes through the metal.

By electric heating it is possible to obtain an efficiency of 80 to 87 per cent. It is used extensively in obtaining heat for housekeeping purposes, such as boiling and baking. An ordinary cooking stove in which solid fuel is used yields but two per cent. of the heat generated, since 12 per cent. is lost in obtaining the fire, 16 per cent. radiates into the room, and 70 per cent. passes out through the chimney. Electric heating is used extensively in bath rooms, street railway cars, and in many waiting rooms. It is employed largely in welding iron and steel, and many other metals which require a high temperature to unite firmly, having the advantage that no flux is required and that the surfaces do not oxidize.

ELECTRICITY (ē-lĕk-trĭs'ĭ-tȳ), the science which treats of an invisible agent producing various manifestations of energy, which is generally rendered active by some molecular disturbance, such as rupture, friction, or chemical action. The name was derived from the Greek word *elektron*, meaning amber, from the circumstance that the Greeks were acquainted with the fact that amber, when rubbed, attracts light particles, such as leaves, straw, or small pieces of wood.

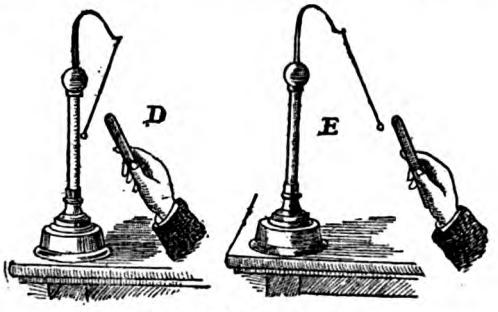
DEFINITIONS. The general science of electricity embraces a consideration of *statical* and *dynamical* electricity, or electric force in a state of rest and electric force in motion. The former is often termed *frictional* electricity, since it is usually produced by friction, but also results from greatly increasing the intensity of dynamical electricity. The latter is developed by magnetism, heat, chemical action, and other forms of energy, and exhibits its power in the form of currents. Electricity resulting from chemical action on metals is termed *voltaic*, or *galvanic*, electricity. The phenomenon of statical or frictional electricity on a simple scale may be observed by rubbing a piece of glass with dry silk, and then placing the glass near small pieces of paper or pith, which will at once be attracted to it. Similar experiments may be made with amber, rosin, gum shellac, and sealing wax.

Formerly all substances that can be electrified easily were called *electrics* and all others were termed *nonelectrics*. When the subject of *conduction* of electricity came to be investigated, it was found that the substances formerly termed electrics are *nonconductors*, and the nonelectrics are *conductors* of electricity. Since all bodies can be electrified under proper circumstances, the terms electrics and nonelectrics were abandoned as incorrect, and the terms conductors and nonconductors were adopted, this classification depending on the ability to conduct electric currents, though there are no perfect nonconductors, with the possible exception of dry gases. The term *insulator* is applied to a substance that has small conductive power, and the word *resistance* is used to express the opposition which the conducting substances forming the circuit offer to the passage of electricity. A good conductor is said to have low resistance, and a good insulator to have high resistance. The following is a partial list of substances having low and high resistance, with the best conductors and the best nonconductors named first:

CONDUCTORS.	NONCONDUCTORS.
All metals.	Shellac.
Charcoal.	Amber.
Plumbago.	Resins.
Concentrated acids.	Sulphur.
Dilute acids.	Wax.
Saline solutions.	Jet.
Spring water.	Glass.
Rain water.	Mica.
Snow.	Diamond.
Vegetables.	Ebonite.

Electricity is produced for general purposes by a conductor being rubbed on a nonconductor, as in an ordinary electrical machine having appliances to cause glass to rub against an amalgam. Two opposite kinds of electricity are manifested by substances electrified, known as *positive* and *negative*, the positive accumulating in one of the substances and the negative in the other. The presence of the same kind of electricity in different bodies causes them to repel each other, while those being charged with opposite kinds attract each other. It was long thought that electricity is a fluid, but scientists now regard it a condition of strain among the molecules of a body, a form of molecular motion, capable of being communicated like a fluid. However, nothing is known of its nature, and we are able only to understand the laws in accordance with which its phenomena are manifested. When a body is excited electrically, it is said to be *charged*. If the charge of two bodies is equal and opposite, it is neutralized by putting them in contact. When a body is charged positively, it is said to be at high potential; if charged negatively, at low potential, and when discharged, at zero potential.

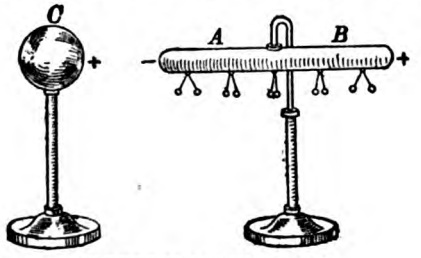
THE ELECTROSCOPE. The electroscope is an instrument used to indicate the presence of electricity, and to identify electrical charges as positive or negative. A simple electroscope consists of a pith ball hung by a fine silk fiber from a glass support. It detects the charge by moving toward or away from the charged body, as in D and E. To illustrate: If the ball be charged from ebonite, it is negative. Now bring the ball near to a body whose charge is unknown. If



SIMPLE ELECTROSCOPE.

it be attracted as in E, the charge of the latter is positive; but, if it be repelled as in D, the charge is negative.

ELECTRIFICATION. Electrical induction is the induced electrification of a body when brought near to an electrified body. The electrification is always of opposite kind to that of the inducing body on the side nearest the latter, and of the same kind on the farthest side. This may be illustrated by bringing an insulated conductor, as the cylinder AB shown in the figure, near a positively charged ball, C, fixed on a glass support, when the cylinder will acquire a negative charge at the end nearest the ball, and a positive charge at the opposite end. The pith balls attached to the cylinder will show by their



ELECTROSTATIC INDUCTION.

movement that the ends of the cylinder are excited most highly electrically, while the parts near the middle are practically neutral. All the electric charge on an insulated conductor lies on the outside of the conductor. However, this is true only of an electric charge. When the electricity is in steady motion, as an electric current, the current passes through the whole substance of a conductor.

When electrification passes from a higher to a lower potential, along a conductor, it is called an *electric current.* This occurs when any other form of energy is converted into electric energy, and two bodies, charged to different potentials, are joined together by wire. In such a case there is a sudden and complete change to equal potentials by a momentary current through the wire, and a continuous current may be maintained by applying the electrification to the two bodies as fast as it is transferred; or, in other words, there must be a constant difference in potentials. In a voltaic battery the difference of potential is maintained by an expenditure of chemical energy; in a thermo battery, by an outlay of heat energy; and in a dynamo, at the expense of mechanical energy. The force produced by changing any other form of energy to electric energy is called *electromotive force,* and the means producing it is termed the *electric source.*

While light has a velocity of 186,000 miles per second, electricity has an estimated velocity of 230,000 miles per second. However, its velocity is not definite, since it depends largely upon the source and the condition of the conductor. Practical experience has demonstrated that its velocity is greater along lines suspended on poles in the air than those laid in subterranean passages. Since the former method combines speed with economy in construction, it is commonly employed, except in cities, where a multiplication of wires is objectionable.

ELECTRICAL QUANTITIES. George Simon Ohm, a German physicist, was the discoverer of the law in accordance with which electricity flows, or passes, through a circuit, which is commonly known as Ohm's Law. This law, briefly stated, implies that the current passing through any circuit is directly proportional to the electromotive force acting on the circuit, and inversely proportional to the resistance of the circuit. In computing electrical quantities certain units are employed, which are called the *volt, ohm,* and *ampere.* The volt is the unit of electromotive force, and was so named from Alessandro Volta (1745-1827), an Italian physicist. It is about equal to the blue-stone cell. The ohm, named from Dr. Ohm, is the unit of electric resistance, and is approximately equal to the resistance offered by two miles of ordinary copper trolley wire. The ampere is the unit of electric current. It was so named from Andre Marie Ampère, and is equal to such a rate of current as will pass through a circuit whose resistance is one ohm, under an electromotive force of one volt.

USES OF ELECTRICITY. The discovery of electric phenomena and the invention of instruments and machinery to practically apply electric forces in the arts, sciences, and industries have caused a remarkable revolution in all lines of economic enterprise. Having a prolific heating effect, electricity has entered as a heating agency into homes, offices, and railway cars. It

is utilized to a large extent in electric welding. For lighting it possesses greater utility than any other form of energy, and its power to propel and move machinery exceeds the dreams of ancient philosophers. The electric spark serves in overcoming the danger formerly experienced in firing explosives, while it speeds symbols and words to all parts of the world, through the medium of the telephone and the telegraph, with the rapidity of lightning. The X-ray (q. v.) has added much of value to physical research and the practice of medicine. Among the latest electrical developments is a process for sending portraits and drawings by means of an electric current over a copper wire. This invention, called the *electrograph,* promises to be of vast value to newspaper publishers and in the detective service.

Past experience has demonstrated that water power is the most economical agent to generate electric currents, though coal, coke, gas, and mineral oil are in extensive use to produce steam for propelling electrical machinery. In many regions, as, for instance, at Niagara Falls, vast machinery is propelled by water power, and the electricity is conveyed by wire to factories at long distances. It is noteworthy that storage batteries at the places of consumption have proven highly profitable in manufacturing centers. While the use of electricity has greatly revolutionized many lines of industry and noticeably modified the arts, it is not improbable that the greatest discoveries and the most useful applications of this force are yet to be made. Certainly, it offers a vast field for study and experiments.

HISTORICAL. As early as the 6th century B. C. the Greek philosopher Thales, one of the seven wise men, wrote of the attractive force of amber when rubbed with silk, and expressed the view that amber possesses a soul. Aside from this phenomenon, nothing was known of electricity until the 16th century, when William Gilbert (1540-1603), physician to Queen Elizabeth, made some valuable experiments and published a work entitled "On the Magnet." Otto von Guericke, a German physician, the inventor of the air pump (q. v.), invented the first electrical machine about 1675. In this machine a ball of sulphur, so arranged that it turned on an axis, was electrified by friction with the hand, receiving negative electricity, while the positive flowed through the person to the earth. The Dutch writer Musschenbroek invented the Leyden jar and first exhibited it at Leyden, Holland. This invention made it possible to gather a greater quantity of electricity than ever had been produced before his time. He was not only able to discharge gunpowder by means of the current, but adapted a metallic conductor in transmitting electricity, and successfully demonstrated that the discharge along two miles of wire was practically instantaneous.

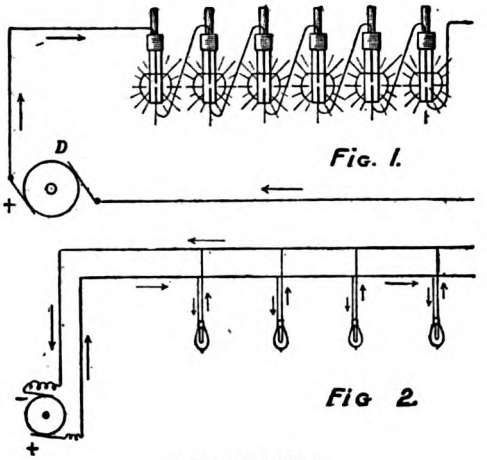
Benjamin Franklin in 1752 proved the identity of lightning and frictional electricity by means of a kite, which he elevated during a thunderstorm, tying a key at the end of a hemp string, and insulating the whole by fastening it to a post by a long piece of silk lace. Later he charged a Leyden jar and in both experiments obtained sparks. However, the former experiment was very dangerous, and a similar test later resulted in several experimenters being struck lifeless by electric currents. *Friction* was the only artificial source of electricity employed until Luigi Galvani in 1790 accidentally brought the limbs of a frog in contact with two metals. He noticed that when they came in contact with the metal a convulsion occurred as if they were in pain, and concluded that the effect was produced by what he termed animal electricity. It was his view that this electricity was different from that caused by friction, and that he had discovered the agent by which the will controls the muscles. Alessandra Volta (q. v.) rejected the idea of animal electricity, and developed the discovery of Galvani until he produced the *galvanic* or *voltaic battery.*

Hans Christian Oersted (1777-1851), of Copenhagen, Denmark, made discoveries in 1820 by which electricity and magnetism began to be studied as allied branches, instead of distinct studies. Andre Marie Ampère (q. v.), a French physicist, discovered that two parallel wires conveying an electric current in the same direction attract each other, but repel each other when in opposite directions. With this discovery the whole subject of electro-magnetism became generalized, and scientists turned their attention to the invention of the electric telegraph and hundreds of other modern devices. Among the inventors who made discoveries of vast value in the field of electricity are S. F. B. Morse, Thomas A. Edison, George Simon Ohm, A. G. Bell, Nikola Tesla, Michael Faraday, W. C. Röentgen, William Marconi, and Ernst Werner Siemens, all of whom are treated in special articles. See **Dynamo; Electrolysis; Galvanism; X-Rays.**

ELECTRICITY, Medical Use of, the employment of electricity in the treatment of diseases. In medical practice three forms are in general use; that is, the galvanic, static, and faradic. *Galvanic electricity* is obtained from a galvanic battery (q. v.), and is used extensively in treating many diseases of the nervous system. It produces a contraction of the muscle upon which it acts, and its application is accompanied by a sensation of heat and a buzzing sound. *Static electricity* is produced by a machine in which glass plates are revolved rapidly against chamois rubbers, and is seen in a succession of sparks that pass into the body of the patient, who is seated on a chair in which the feet are of glass. It has a great electro-motive force and is employed in medicine as a treatment of functional weakness, since it encourages respiration, secretion, circulation, and nu-

trition. *Faradic electricity* is obtained from a faradic battery, invented by Faraday (q. v.) in 1845, in which the current is made and broken with extreme frequency and rapidity. The current is applied by means of electrodes to the human body. It is used in treating paralysis of the muscles, hysteria, gout, and rheumatism. Another form of electrical machines is used in cauterizing and removing diseased or foreign tissues. Surgeons employ for this purpose an instrument in which the electrodes are joined by fine wire, the current raising the latter to a white heat. See **X-Rays.**

ELECTRIC LIGHT, the light obtained by

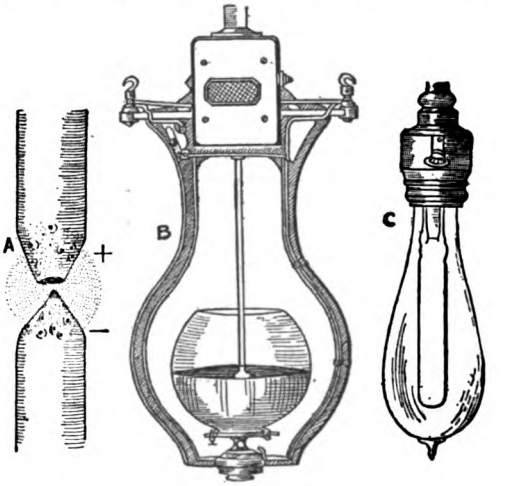


ELECTRIC LIGHT.

Fig. 1, arc lights; Fig. 2, incandescent lights.

conducting a current of electricity through a resisting medium, as a gas or a carbon wire. Many devices are employed for utilizing the luminous effects of electricity for lighting and in electrolysis. The chief systems for lighting may be grouped as the arc and incandescent, both of which are in common use. In each of these a conductor conveys the current from a battery or dynamo D, and a brilliant light is obtained at any point where the current is broken. The so-called arc light is produced by connecting the two ends of the wire with two pointed sticks or pencils of carbon, and, when the carbon pencils are separated about one-tenth of an inch, the current passing from the positive to the negative pole, a light rivaling sunlight in whiteness results. The brilliant arc of light, called the voltaic arc, continues as long as the pencils are adjusted the proper distance from each other, which is provided for by a self-feeding mechanical contrivance. An intense heat is generated in an arc light, which is sufficient to fuse quartz and magnesium and melt platinum. Both carbons decrease in size, though the positive decreases more rapidly than the negative, and the latter remains pointed. The intense heat tends to volatilize the carbon, causing small particles of the positive carbon to be carried in the form of an arc or bow and to become condensed in the form of graphite. Arc lights give a light too brilliant for small rooms, but are favored greatly for large buildings and for street lights. The dynamo must yield a current of constant strength, but of varying potential, according to the number of lamps. In some systems of lighting as many as fifty or even seventy-five lamps are lighted by one machine, each lamp ranging in intensity from 500 to 2,000 candle power.

The incandescent lamp is obtained by rendering incandescent a thread or filament of carbon by passing through it a current of electricity. While there are various modes of obtaining the carbon filament, the common way is to press a carbonaceous paste in a die plate, and then finish by carbonizing. In the Edison incandescent lamp a filament of bamboo, little thicker than a horsehair, is carbonized in the form of a loop. The ends of the filament are fixed to two insulated platinum wires, and, as the carbon readily burns in the air, practically all the air in the glass chamber must be exhausted. The lamp is then screwed into a socket, where the wires within the glass chamber are brought in contact with two insulated brass plates, in which the wire of the circuit terminates. Usually a large number of incandescent lamps are connected with the same wire, and all take current from one of the line wires, returning it to the other wire of the circuit as shown in the illustration. However, all the lamps in a given system require the same current as every other. A turn-off enables one to close or open the circuit, thus lighting or extinguishing any one or all the lamps. A sixteen candle power incandescent lamp requires a current of about a half an ampere at 110 volts, or 55 watts.



ELECTRIC LIGHT.

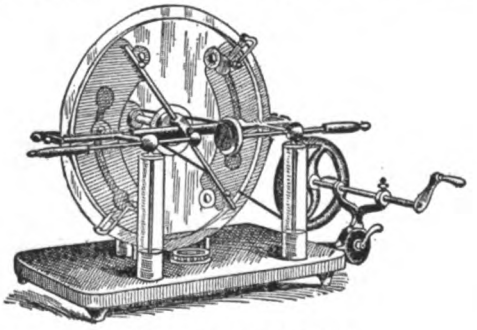
A, **carbon pencils; *B*, arc lamp; *C*, incandescent lamp.**

Improvements of vast value in electric lighting

were made in 1907, when the flaming arc lamp came into use. In this lamp the carbon is impregnated or cured with metallic salts, whose luminous vapors give increased light. Other newer forms include the helion, the tungsten, and the metallized carbon lamps, but, while they have a greater candle power efficiency, they are more costly and more fragile than the ordinary carbon lamp. Other improvements include those made in the mercury vapor lamp, which has been made highly serviceable in photography and other arts in which a brilliant white light is essential. Glass has been displaced to some extent in making the tube, from which the air is exhausted, and an intense light results when an electric current is passed from one electrode to the other through the vapor of mercury.

The electric currents ordinarily employed produce no marked mechanical effect, as those from a battery of Leyden jars, or a flash of lightning (q. v.), in which the results are destructive, especially if the path is formed of poor conducting material. Electric light, like solar light, acts chemically on chloride of silver in the photographic process. It is an important means of chemical analysis. When a current of electricity passes between two terminals or electrodes, through a compound liquid or electrolyte, it has the effect of decomposing the molecules of the electrolyte into constituent parts called ions or radicals. Decomposition occurring in this manner is called electrolysis.

ELECTRIC MACHINE, the name generally applied to any mechanism employed to convert mechanical energy into electric current. There is a very wide difference in construction



TOEPLER-HOLTZ MACHINE.

and capacity of the machines in common use for producing powerful electrical effects. Any machine depending upon the principle of the electro-magnet is now generally called a dynamo, which see. The mechanisms more properly designated electric machines include the two classes that depend upon friction and electrostatic induction, and are known respectively as *friction* and *influence* machines. The so-called plate electric machine is a common example of the former. It has a circular plate of glass, which may be turned on an axis by an insulated handle. A rubber with a surface coating of an amalgam is pressed by a spring against the plate, and is in electrical contact with an insulated conductor, termed the negative conductor. At the opposite side is a device with metallic points, which connect the positive conductor. When the handle is turned, a negative charge is manifest in the rubber, and a positive charge in the glass. As the motion of the machine continues the negative charge is conducted to the negative conductor and the positive conductor becomes charged positively by the electricity on the glass. The Toepler-Holtz machine, which is generally a revolving electrophorus, comprises a common electrostatic induction machine. The machines generally used in experiments in high schools and colleges belong usually to one of these classes, but there are mechanisms of similar construction sufficiently powerful to serve many purposes in the arts and industries.

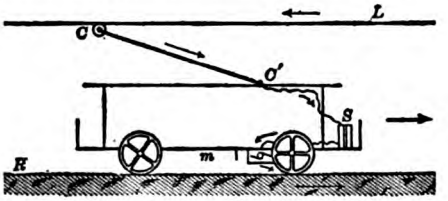
ELECTRIC METER, an appliance for measuring and recording the amount of electricity consumed. Three kinds are sold on the market, those known as clockwork recorders, motor meters, and chemical meters. The clockwork recorder has a stylus by which a record is made upon a chronograph sheet driven by clockwork as the current passes through a galvanometer. It is not used extensively on account of being expensive and because the clockwork devices are not easily maintained. The chemical meter is a zinc voltometer, and a record is obtained by weighing the plates from time to time. The motor meter is in general use. It is an electric motor, the speed of which is recorded by a dial device by means of a clockwork. This clockwork is connected with an armature, which revolves according to the speed of the current that passes through the meter. The watt, which is a current of one ampere, with a pressure of one volt, flowing for one hour, is the unit of measure. Each consumer of electricity usually has an electric meter, which is read once a month, and the amount paid for service depends upon the electric energy consumed.

ELECTRIC MOTOR, a machine used to convert electrical energy into the form of mechanical power. It is constructed on the plan of a dynamo (q. v.), but differs from it is that it is supplied with a direct electric current from an outside source, while the dynamo is used to generate electric currents. The iron masses or electro-magnets, called armatures, are set in motion by the action on them of stationary electro-magnets, hence the armature revolves as the effect of repulsion and attraction. The movement is at a uniform rate of speed, in case the current is constant and the resistance even. In general any dynamo is reversible and can be used as a motor, but these machines are constructed for particular purposes and in practice are not interchangeable. Dynamos are much

more powerful than motors and may furnish the power necessary to operate a number of motors, which may be located a long distance from the dynamo and from each other. Two motors of fifty horse power each, or ten motors of ten horse power each, may be supplied with power by a dynamo having 100 horse power.

Many machines are now operated by means of the electric motor, such as printing presses, cutting machines, elevators, pumps, etc. The advantage of the electric motor is chiefly in its convenience. It does not require a skilled operator and can be utilized in running machinery on a moment's notice. The power may be turned off as soon as a particular job or a definite part of the work is finished. The plant in which the dynamo is located may be a long distance from some or all of the motors, and the work of firing or looking after the power plant becomes centralized. In large factories, where work is done in many departments, the power plant may be in an isolated part of the building, and the employment of motors under such conditions entirely obviates the use of expensive belting, shafting, and pulleys.

ELECTRIC RAILWAY, a means of rapid transit on which the motive power is electricity. Various different mechanical devices are em-



ELECTRIC CAR.

ployed for this purpose, all depending upon the frictional or rolling contact of electricity supplied to a motor on the car or locomotive, either from a generating plant or from a storage battery. The electric railways are built similarly to the steam railroads, but in general the roadbed is not graded as level and is more tortuous, although the best service can be obtained on a straight and level track. The ties are of wood and the rails are iron or steel, but neither are quite as heavy as those used in steam railways. In cities the ties are now commonly laid in cement, so as to furnish a solid foundation for the street pavement, but in the outlying districts and in the country they are usually placed in a trench excavated about four to six inches from the surface of the roadbed. The size and construction of the cars differ greatly, both for the freight and passenger service, and the manner of applying the electric current is not uniform in all systems. In most of the American lines the power plant is located at some convenient point on the line, from which the conducting current is carried on a copper wire L in a continuous circuit immediately overhead of the center of the street railroad track, where it is suspended from a line of poles. The motor car, to which trailers, or other cars, may be connected, has a trolley CC′ attached to the roof, and by it the current is conducted by means of a wire through the switch S to the motor m, which has connection by gearing with the axles of the car wheels. Short copper wires or plates are bolted so as to connect the rails of the track, or the rails are united by electric welding, thus supplying a continuous circuit for the electric current, which passes through the motor into the car wheels, and thence back to the dynamo by the connected rails R.

Other methods include the underground or conduit, the third-rail, and the storage-battery systems. In the underground or conduit system the current is obtained by a sliding shoe, or some similar device, attached to an arm under the car, which comes in contact with an electric wire in a channel or conduit. The third-rail system is quite similar in its general operation to the overhead system, but differs from it in that a third rail is attached to the ties by means of insulated supports. Beneath the car is a sliding shoe, which operates to conduct the current to the motor, and it thence returns by the track rails. In the storage-battery system each car or train employs a storage battery, which is charged at the power plant, and usually carries sufficient power to supply motive force for one or more trips. All these systems are in use more or less, though the latter three more largely in Europe than America, while the overhead trolley system is the general system employed in America. The third-rail system is quite popular in Europe, and has the advantage of overcoming the overhead obstruction of trolley wires, but greater care must be exercised to guard against danger to pedestrians. Many of the elevated railroads make use of the third-rail system, as is evidenced in Chicago and other American cities.

Railway companies are now using electric locomotives to a considerable extent. They resemble the steam locomotive and are fully equal to it in power. The transmission used is either the overhead trolley or the third rail. Locomotives of this kind have been in use for some time on some branches of the Baltimore and Ohio and other systems. A large locomotive has four motors of about 600 horse power each. It is provided with a whistle, sand boxes, and automatic air brakes.

The history of the electric railways dates from 1879, when Dr. Siemens (q. v.), of Berlin, Germany, demonstrated their practicability on a track 220 yards long at the Berlin Exposition. Two years later an electric railroad a mile and a half long was put in successful operation in Berlin, and from thence the enterprise spread to other European cities, and then to America. The first line in the United States was built at Allegheny, Pa., in 1882, though Edison experi-

mented with a line at Menlo Park, N. J., some time before. At present practically all the cities of Canada and the United States with a population of about 10,000 or more have electric railways, and in the thickly settled portions hundreds of miles are operated through suburban and rural districts. There is scarcely a thriving city in the world that has not introduced electricity as a lighting or propelling agent, except in various portions of Asia. In 1911 Canada and Newfoundland had 1,380 miles of electric railways in operation, while the United States had 41,682 miles.

ELECTRO-CHEMISTRY (ĕ-lĕk'trō-kĕm'ĭs-trў), the branch of chemistry which treats of the chemical changes that are due to electrical energy, and investigates the chemical changes by which electricity is produced. That electricity causes chemical changes may be illustrated by placing two platinum rods in a strong solution of common salt, then connecting them with a battery or a dynamo, when the current will decompose the solution and the sodium will be set free at the negative electrode, while caustic soda will be formed as the sodium combines with the water, and at the same time the chlorine will escape in bubbles through the liquid being set free at the positive electrode. That chemical action produces electricity is demonstrated by placing a zinc bar in a solution of zinc sulphate and a copper bar in a solution of copper sulphate, the solutions being separated by a porous partition, and as soon as the rods are connected by wire a current of electricity will pass through the circuit. Electro-chemistry is employed in the manufacture of various chemical products, in extracting metals from their ores, and in electrotyping and electroplating. It enters into the manufacture of carborundum, chlorine, soda, and potassium chlorate.

ELECTRO-CULTURE OF PLANTS, the method of stimulating the growth and development of plants by the use of electricity. Practical use has shown conclusively that electricity may be used as a stimulus in the form of electric light and by applying the current to the soil, the seed, and the plant. It has been demonstrated that seeds germinate more rapidly by applying electric stimuli before planting, requiring about half the time needed for seed untreated. Another method is to electrify a plot of ground by placing a system of wires in the soil, which are attached to a battery or electric machine at stated intervals. By either of these methods it is possible to increase the production of vegetables, especially peas, parsnips, tomatoes, beets, onions, and carrots. Both the arc and incandescent lights have a visible effect upon growing plants, in that they furnish beneficial rays and prevent injurious rays from passing through them. The flowering of Easter lilies has been hastened as much as ten days and at the same time the colors have been improved, while the yield of lettuce has been increased considerably. The use of electricity in the culture of plants is comparatively new, but it is reasonably certain that the yield of both flowers and fruit can be increased sufficiently to cover the expense.

ELECTROCUTION (ĕ-lĕk-trŏ-kū'shŭn), the method of inflicting corporal punishment by passing a current of electricity through the body of the criminal. The State of New York adopted this method in 1888, and since then it was adopted in Ohio and recommended by many commissioners and committees. It is looked upon as more humane than either hanging or decapitation, since death is painless and instantaneous.

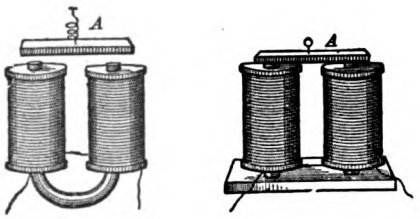
ELECTRODE (ĕ-lĕk'trōd), the terminals by which electricity is conveyed into and out of different media. The term is applied especially to the ends of the wires or conductors which lead from the source of electricity and terminate in the medium traversed by the current. Faraday introduced the terms *anode* and *cathode,* the former being the positive and the latter the negative electrode. The term is applied especially to the poles of the voltaic pile or battery.

ELECTROLYSIS (ĕ-lĕk-trŏl'ĭ-sĭs), the decomposition of chemical compounds by the action of a current of electricity. When an electric current is passed between suitable terminals or electrodes, through a compound liquid, or electrolyte, it decomposes the molecules of the electrolyte into two constituent parts called ions or radicals, which appear at the positive and negative electrodes. The electro-positive ions or radicals appear at the negative electrode, and the electro-negative ions or radicals, at the positive electrode. In salts of the metals, the metal itself is electro-positive, and the element or elements with which it is combined are electro-negatives. Electrolysis has been a subject for much discussion in the cities where strong electric currents are utilized in the industries, since it tends to destroy the metal pipes that are used in the construction of sewers and for gas and water mains. It is due to unsuitable lines for carrying return currents of electricity, hence these find their way back to the plant through the metal pipes lying underground. The subject has been one of considerable controversy between street railway companies and corporations having control of plants which utilize metal pipes, such as gas plants and waterworks.

ELECTRO-MAGNET (ĕ-lĕk-trō-măg'net). See **Magnetism; Electro-Magnetism.**

ELECTRO-MAGNETISM, the science which treats of the development of magnetism by voltaic electricity. Though the exact nature of electricity and magnetism is unknown, they are generally thought to be allied phenomena, as is evidenced by the fact that an electric current always produces a magnetic flux, or magnetism, when flowing through a conductor. Besides, a magnetic flux always causes electro-motive force when crossing an electric conductor, and enters

or emerges from a bend or curve in a conductor. It has been observed that a magnetic flux, surrounding a conductor through which an electric current is passing, flows around the conductor in concentric circular paths, and decreases in intensity as the distance from the conductor increases. The direction of the flow is dependent upon the electric current, and changes with every change in the direction of the current. Since the flux of all magnets flows from one pole and returns to the other, as shown by the armature A in the illustration, it follows that the loop or loops of an active conductor act as a magnet, and are similar to it in having two poles. The magnet produced in this way by an electric current is termed an electro-magnet.



ELECTRO-MAGNET.

The strength of an electro-magnet depends upon the quantity of magnetic flux flowing through the magnet. The strength of the magnet is increased by increasing the strength of the current, but also in the same current by increasing the number of loops. Thus, the strength of an electro-magnet depends on the number of turns or loops, or upon the strength of the current; both facts are taken advantage of in the construction of electric machinery. There is an attractive force between two unequally strong electro-magnets in proportion to the square of the sum of both currents. The accompanying cut shows the horseshoe magnet, which is the form preferred, since the two poles are sufficiently near together to permit the application of the armature A to both at once.

ELECTROMETER (ē-lĕk-trŏm'ē-tĕr), an instrument used in measuring the difference of potential between two charged conductors. The difference of potential is also measured by a *galvanometer,* but this is generally of high resistance, and, if calibrated to read volts, is called a *voltmeter.* Other devices used to indicate the amount of electricity with which a given conductor is charged are the *torsion balance* and the *electroscope.* Sir William Thomson (Lord Kelvin) is the inventor of the electrometer, and his quadrant-electrometer is the principal form of this instrument now in use. It has a needle of thin aluminium suspended over four quadrants which are connected in pairs, and the needle is attracted by one set and repelled by the other when the charges of electricity are communicated to the quadrant, the deflection depending upon the potential difference to which the quadrants are charged. Another form of the instrument has a small movable mirror suspended by a fine thread, and by it a spot of light from a lamp is reflected to a paper scale. The spot of light is seen in the middle of the scale when the two conductors have the same potential, and the potential difference, if any, is indicated by its movement to either side. These instruments are sufficiently delicate to indicate the potential difference of the two plates of a single galvanic cell.

ELECTRO-MOTIVE FORCE (ē-lĕk'trō-mō'tĭv), the force which produces, or tends to produce, electricity or an electric current. The words *electro-motive force* usually are contracted for convenience E. M. F. Any device by means of which an electro-motive force is produced is called an electric source. A voltaic cell, a dynamo-electric machine, or a frictional electric machine is an example of an electric source.

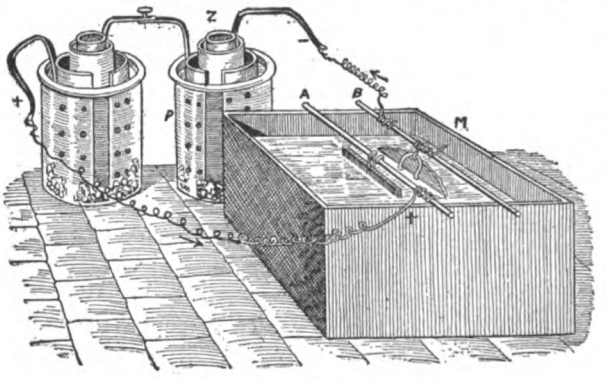
The term electro-motive force is sometimes used to express the degree of electrification as equivalent to potential, or, more properly, the difference of potential at the terminals of a cell when it is on an open circuit. It is the sum of all the differences of potential in the circuit when a cell is sending a current. The practical unit of electro-motive force is the volt, which is about equal to the electro-motive force of a standard Clark's cell at a temperature of 15 C. Wires carrying an electro-motive force of less than 200 volts are not considered dangerous, but those connected with a large dynamo usually carry a voltage of from 800 to 2,000.

ELECTROSCOPE (ē-lĕk'trō-skōp). See **Electricity.**

ELECTROTYPING (ē-lĕk'trō-tīp-ĭng), the process of producing copies of engraved plates, printing type, woodcuts, and other devices used in printing by means of an electric deposition of copper upon a mold taken from the original. The process consists of taking an impression of the object on beeswax, ozocerite, or guttapercha, this being done on a powerful press. Various methods of treatment are employed, differing somewhat according to the material used. If beeswax is used, which is not a conductor of electricity, the surface is brushed with plumbago to render it a conductor. The mold is then suspended in a solution of copper sulphate in a vessel M, as shown in the illustration, from the negative pole B of a galvanic battery P, and a plate of copper is hung opposite on the positive pole A. As the copper is decomposed by the electric current, the metal goes to the negative pole and is deposited upon the mold. On the other hand, the acid, passing to the positive pole, operates to dissolve the copper, thereby preserving the strength of the solution While the process here described is still used,

it is now common to obtain the electric current from a dynamo-electric machine.

After the process is completed, which usually takes several hours, the thin shell formed in the mold is removed from the beeswax and backed up with electrotype metal. When smoothed, it is ready for the printing press, is mounted on blocks provided with ratchet and a foot, or attached to a wooden block, making it type high in either case. Electroplating is a similar process, but the coating is of silver or gold. It is usually preferred to use German silver, copper, brass, or nickel silver as the base, as both gold and silver are readily deposited on these. It is necessary to thoroughly cleanse the articles to be plated. In plating with silver a plate or bar of silver is hung on the positive pole, and in about five minutes a coating is deposited to conceal the other metal, which may then be polished. Gold plating is a similar process.



APPARATUS FOR ELECTROTYPING.

ELEGY (ĕl'ē-jĭ), a poem written in an earnest, melancholy style. The ancient Greeks and Romans applied the term to the martial lyrics and the erotic poems, and sometimes extended its use to describe the lessons of practical wisdom by such writers as Solon. Catullus was the first great elegiac writer of the Romans, and after him came Propertius, Tibullus, and Ovid. Modern literature contains many fine lyrics, such as Tennyson's "In Memoriam," Milton's "Lycidas," and Gray's "Elegy Written in a Country Churchyard."

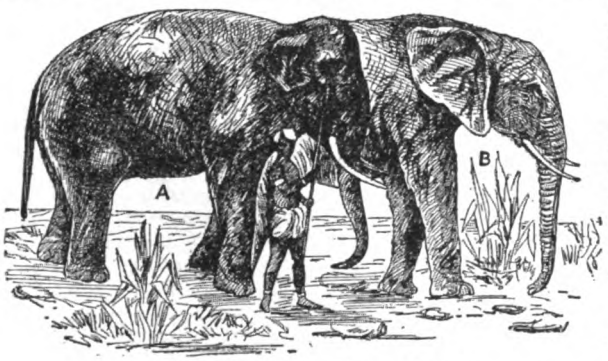
ELEMENTS (ĕl'ē-mẹnts), the constituent principles of anything which have never been resolved into more simple forms of matter. The term has a different signification in modern science than it had formerly. The Greek philosophers assumed that four elements—fire, air, water, and earth—give rise to all the things that are manifest. Modern science considers matter as existing in four forms—imponderable, gaseous, liquid, and solid—while the elements are treated as the component ingredients of bodies under whatever form they exist. Neither air, water, nor earth are elements, and fire is a component of heat. For example, water is composed of two parts of hydrogen and one of oxygen. If a molecule of water be divided into three atoms, two of hydrogen and one oxygen, each division is an element. The number of elementary substances is not known, but about seventy are now admitted without further investigation. Oxygen, hydrogen, nitrogen, and carbon are the chief constituents of all organic matter. Rocks are composed chiefly of oxides, silicon, calcium, magnesium, aluminium, iron, sodium, potassium, and carbon. These, together with sulphur, hydrogen, chlorine, nitrogen, and oxygen, constitute by weight 99-100 of the earth's entire crust. See **Chemistry.**

ELEPHANT (ĕl'ē-fạnt), the largest living land animal, and the sole surviving representative of the suborder *Proboscidea.* Only two species of the family *Elephantidae* remain, the Asiatic and the African. The former is distinguished from the latter by its greater height, smaller ears, concave forehead, and four external hoofs on the hind foot, while the African has three. Elephants, when full grown, are from nine to fifteen feet high and weigh from 4,000 to 9,000 pounds. They live one hundred years and upwards. Elephants have remarkably large bodies, a thick skin, a scant growth of hair, a short neck, an enormous head, large legs and feet, and a proboscis or trunk. The proboscis is a huge elongation of the nose and upper lip, and is composed almost wholly of a mass of muscles, numbering, according to Cuvier, fully 40,000, which give it the greatest diversity of motion. The trunk is very strong and serves alike for respiration, smell, taste, touch, and prehension. At the extremity of the trunk, on the upper surface, are two fingerlike projections with a thick tubercle below, which acts the part of the thumb, the whole forming an organ of prehension comparable in many respects to the human hand.

With the trunk the animal collects food and takes in drink. It exercises extreme caution in using the trunk in combat; without it the animal is helpless, even to feed itself. It breathes through the openings in the trunk, which it can easily hold above the surface of the water while bathing or crossing a stream. Indeed, it is fond of an abundance of water and swims with ease and skill. It has no canine teeth and only two incisors on the upper jaw, which assume the character of tusks and attain an enormous size; a single tusk often weighs from 100 to 200 pounds. These tusks comprise the most elastic and best form of commercial ivory. In some species they attain a length of seven or eight feet, and serve to break off small branches, tear climbing plants from trees, loosen roots, fight other animals, and, in a state of domesti-

cation, to ply or carry timbers and move stones. Elephants have an ability to run quite equal to that of a horse. In lying down they do not place the hind legs beneath the body, but extend them backward in the manner of a person kneeling. The female breeds at fifteen years of age, bearing a single young at a birth; the period of gestation is about 21 months. The young elephant sucks with its mouth and not with the trunk.

Elephants associate together in considerable herds, under the guidance of a single leader, usually the most powerful animal. It gives the alarm in case of peril and controls the movements of the herd. In times of danger the herd is remarkably anxious to protect it, which is done by crowding so eagerly to the front that the hunters often shoot some less valuable individuals before it can be reached. Sometimes an elephant is driven from the herd, and is never allowed to join another, but ever after leads a solitary life. Such individuals are known as *rogues,* or *low-castes,* and are by far



A, Asiatic elephant; *B,* African elephant.

the most dangerous to meet. Elephants are domesticated and serve for tiger hunting, beasts of burden, and in time of war. The Romans were frightened when Hannibal brought a troop of elephants over the Alps, but later learned to use them in war and various arts of peace. It is indicated from fossil remains of the genus *elephas* that at least fourteen species lived in former times, while the species classed with the allied genus *mastodon* were still more numerous. Fossil remains appear in the Pliocene of North and South America and in the Miocene and Pliocene of Europe, but they became extinct in the Western Hemisphere and emigrated from Europe to Asia and Africa in the Pleistocene period.

ELEPHANTA (ĕl-ē-făn'tȧ), a small island of British India, in the Bay of Bombay, about five miles from the mainland. It is five miles in circuit and the surface consists of two hills with a valley between them. Near the main landing place are a number of temples or caves cut into the solid rock. The largest of these is 130 feet long and 123 feet broad, the roof is supported by pillars of great magnitudes, and the walls are sculptured by the Hindu trinity, Brahma, Vishnu, and Siva. These temples are used by the Baniya caste for certain Hindu festivals. It is thought that the temples are more recent than the birth of Christ.

ELEPHANT BEETLE, a giant beetle of Central America, so named from its large size. The length is about five inches, including a forked horn which projects from the head. It has a blackish color, but is covered with a yellowish fur. This fur is soft and upright and is easily removed by rubbing, hence most of the specimens are bare and appear almost black.

ELEPHANT FISH, the common name of the *chimaera,* so called from its upper extension of the nose, which resembles a proboscis. The flesh is esteemed as food, for which it is caught off the coast of the Cape of Good Hope and other regions of the South Pacific.

ELEPHANTIASIS (ĕl-ē-făn-tī'ȧ-sĭs), a disease of the skin and areolar tissues, epidemic in the East and West Indies. It begins with headache and fever, after which the leg or arm becomes inflamed and tender and serum afterward exudes. Attacks will follow each other and the affected limb will become very large in size. Some cases are due to malarial infection, while others result from the bite of certain mosquitoes. The elephantiasis of the Greeks is a form of leprosy.

ELEPHANTINE (ĕl-ē-făn'tē-nȧ), an island in the upper Nile, opposite Assuan, known anciently as Syene. It is formed of granite covered with a fertile soil, ānd is about a half a mile wide and one mile long. Herodotus mentions it as the boundary between Egypt and Ethiopia, but afterward Phyle was regarded as the southern landmark of Egypt. The island contains many ancient ruins, including several temples, fragments of pottery with Greek inscriptions, and a gateway of the time of Alexander. The Persians as well as the Romans fortified Elephantine as an important strategic point.

ELEPHANT SEAL, the proboscis seal, or sea elephant, so named from the proboscislike projection of the upper lip of the male. It is the largest of the seal family, often attaining a length of twenty to thirty feet. The female is much smaller than the male and has no proboscis. Two species have been described, one found off the coast of western Mexico and California, and the other in the vicinity of the Kerguelen Islands, Heard's Island, and Patagonia. However, both are becoming rare because of extensive slaughter. These animals are hunted for their oil, which burns with a clear flame, a single individual yielding about twenty gallons. The skin is useful in making harness and other products made of leather.

ELEUSIS (ē-lū'sĭs), a celebrated city of

ancient Attica, formerly situated on the Bay of Eleusis, near the confines of Megaris, and connected with Athens by the Sacred Road. Its fame is due largely to the festivals observed by the Greeks in honor of Demeter. The *Eleusinian Mysteries,* as the festivals were called, were divided into the greater and lesser, and, according to general account, held every five years. The lessons taught were of the highest moral character and were intended to inculcate the doctrine of the immortality of the soul. It was held that the souls of those who participated in them were filled with sweetest hopes, both of this and the future world, and that in them no one was sad. The ceremonies were awe inspiring, and their secrecy was strictly enjoined by the death penalty. Initiation in the lesser prepared for admittance to the greater, the initiation into both being followed by numerous games given amid great rejoicing.

ELEUTHERA (ē-lū'thēr-ä), an island of the Bahamas, about seventy miles long and from two to ten miles wide. The area is 235 square miles. It produces Eleutheria bark, a bitter, aromatic bark sometimes called cascarilla, fruits, live stock, and cereals. Governor's Harbor is the chief town. Population, 1908, 8,843.

ELEVATED RAILWAY, a line of railway built in large cities, usually on a framework erected on the surface of the street. Formerly the framework was constructed of timbers, but now it is entirely of iron pillars, spanned by crossbeams, and mounted by plate girders. Passengers ascend by stairways or elevators to the stations, which are usually from two to four blocks apart, and the fare is generally collected when passing from the depot to the platform at which the car is entered. Elevated railway transportation has the advantage of being more rapid than surface lines, since the cars stop only at the stations and are not obstructed by traffic on the streets. In 1867 the first elevated railway was built in New York, and the success of the enterprise caused the system to be extended in that city and established elsewhere. Extensive lines are now operated in Brooklyn, New York, Boston, and Chicago. The principal elevated railways of Europe are in Berlin, Paris, and Liverpool. Electricity is the chief motive power. Some of the cities in Germany have suspended railways, in which the cars are suspended beneath the girder, such as the line between Barmen and Elberfeld.

ELEVATOR (ĕl'ē-vā-tēr), an apparatus consisting usually of a cage or movable platform, and used to raise and lower persons and goods in large buildings. These mechanical contrivances are comparatively modern and are in extensive use in the large cities of America, Australia, and Europe. They have materially increased the usefulness and convenience of high buildings. The public has become accustomed to the use of elevators, and general confidence in the efficiency and safety of these beneficial devices has led to their extensive employment. The security of the passenger elevator is assured by the multiplication of cables, by means of which the elevators are lifted and lowered while under perfect control of the operator. Four cables are usually employed to facilitate movement, two for attaching counterbalance weights, and several safety appliances are attached to guard against danger from moving downward at an excessive speed. The modern improvements added have rendered it as safe to ride in an elevator as on an ordinary street car, while the time consumed in passing to the highest fifteen or twenty story buildings has been reduced to only a moment.

Passenger elevators are operated either by hydraulic or electric power. The water pressure in hydraulic elevators is supplied from tanks, which are filled by means of powerful pumps located in the basement, air-pressure devices being utilized quite extensively for that purpose. By means of hydraulic passenger elevators it is possible to ascend with much smoothness of motion and entire safety at a rate of from 300 to 400 feet per minute. Within recent years the electric elevators of various construction have gone into general use, and are preferred to the hydraulic kind for various purposes. They are constructed in such a manner that a rope is wound around a large drum by the agency of electric motors, thus causing the cage or platform to be moved up or down with entire satisfaction. This form is simpler than the hydraulic and can be operated at a much smaller cost.

The construction of tall buildings with forty or more stories has made the hydraulic and the ordinary electric elevators undesirable, since the former occupies too much space and the latter requires a drum which is too large in size. Accordingly, a new type of the electric elevator has been devised, in which either the direct traction or the cable drive is employed. In both of these systems the application of power is identical with that employed in street railways. The term elevator is applied to buildings used for the storage of large quantities of grain. It is applied also to a mechanical contrivance consisting of a belt to which boxes or buckets are attached, being used for the purpose of elevating grain and commodities. A good example of the latter is found in threshing machines. See **Grain Elevator.**

ELGAR, Sir Edward William, musician, born at Broadheath, England, June 2, 1857. He studied at Littleton House and afterward received private instruction on the violin and the organ. He began as a conductor at Worcester in 1882, and three years later became organist at Saint George's Church. In 1889 he gave up these positions and devoted his attention entirely to composition. Many of his works are well known in Canada and the United States, where they are quite as popular as they are in England. Edward VII. knighted him in 1904,

and the following year he was granted the degree of doctor of music by Yale University. Among his productions are the oratorio "The Light of Life," the cantata "The Black Knight," and the concert overture "Cockaigne." In 1903 he produced "The Apostles" at the Birmingham festival, and it was reproduced in German at Cologne in 1904.

ELGIN (ĕl'jĭn), a city of Illinois, in Kane County, on the Fox River, about 35 miles northwest of Chicago. It is on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railroads and on the Chicago, Elgin and Aurora Electric Railway. The noteworthy buildings include the Northern Illinois Hospital for the Insane, the public high school, the Gail Borden Public Library, the Elgin Academy, and a college of music. Water power for industrial purposes is obtained from the Fox River. Among the manufactures are carriages, watches, farming implements, washing machines, cigars, and condensed milk. It has several cotton and soap factories and meat-packing establishments. The output of watches aggregates about 2,000 daily, in which industry 2,800 skilled laborers are employed. The streets are generally well paved and improved by grading and drainage. Elgin was settled in 1835 and incorporated in 1854. Population, 1900, 22,433; in 1910, 25,976.

ELGIN MARBLES, the celebrated collection of ancient sculptures brought from Greece by Thomas, seventh Earl of Elgin, and purchased in 1816 by Parliament for the British museum at a cost of $175,000. The sculptures are among the best that adorned certain buildings on the Acropolis of Athens. They include those of Theseus or Hercules, the torso of Cecrops, the Fates, Proserpina, Iris, Ceres, the torsos of Neptune and Minerva, the heads of the horses of Hyperion, and one of the horses of Night. Their removal to England was generally condemned as an act of injustice, a view in which Lord Byron concurred.

ELI (ē'lī), a judge of Israel and a priest at the temple of Shiloh, the predecessor of Samuel. He judged Israel forty years, but was unable to overcome the reluctance and rapacity of his sons, Hophni and Phinehas, which displeased the people. The Philistines took advantage of his weakened authority by advancing against Israel. They gained a completed victory in the Battle of Ebenezer, slew both of Eli's sons, and carried off the ark of God. When Eli heard the news, he fell from his seat and died, being then 98 years of age. See I. Sam. iv, 15-18.

ELIJAH (ē-lī'jah), called Elias in the New Testament, the greatest and sternest of the prophets of Israel, born at Tishbe, in Gilead. His history is given in connection with the reigns of Ahab (I Kings xvii-xxi) and his successor, Ahaziah (II Kings i-ii). He flourished in the time of Ahab about 920 B. C. When that monarch had introduced the worship of Baal, Elijah pronounced a curse on the land, but he was obliged to flee for safety. He took refuge by the brook Cherith, where he was miraculously fed by ravens. Subsequently he went to Zarephath and lodged with a widow, prolonged her supply of oil and meal, and restored her son to health. An extended drought and famine led to a reconciliation with Ahab. Soon after he demonstrated the vanity of the worship of Baal. This caused the people to destroy the idolatrous prophets, a circumstance leading Queen Jezebel, wife of Ahab, to vow vengeance. To escape her anger he fled to Mount Horeb and hid in a cave, where he had an interview with Jehovah, who instructed him, and advised the selection of Elisha as his successor. When Ahab wrongfully took possession of Naboth's vineyard, Elijah denounced the monarch and pronounced a curse upon him and his wife. Later he denounced the son and heir of Ahab, Ahaziah, who vainly sought to destroy him. He visited the prophets at Bethel and proceeded with Elisha across the Jordan. While there a chariot and horses of fire appeared, and he was taken up by a whirlwind into heaven. According to Jewish tradition, he is to return for the restoration of Israel, though Christians hold that prophecy was fulfilled by the advent of John the Baptist. In the transfiguration of Christ, Elijah appeared with the Savior and Moses.

ELIOT (ĕl'ĭ-ŭt), **Charles William,** educator, born in Boston, Mass., March 20, 1834. He graduated at Harvard in 1853, was appointed tutor in mathematics at Harvard in 1854, and later became assistant professor in mathematics and chemistry. In 1861 he was engaged as teacher of chemistry in the Lawrence Scientific School. He studied chemistry in Europe in 1863-65, and, on returning to Massachusetts, became professor of analytical chemistry in the Institute of Technology, and was made president of Harvard University in 1869. His efficiency in higher education has had a marked effect on the educational status of America. His distinguished abilities were recognized by Williams, Princeton, and Yale, from each of which he received degrees. Besides holding membership in many domestic and foreign scientific associations, he acquired much repute by active coöperation in the American Academy of Science. In 1908 he resigned from the presidency of Harvard, after a useful service of about forty years, to devote himself more closely to literary work. Among his publications are "The Compendious Manual of Qualitative Chemical Analysis," "Essays and



CHARLES W. ELIOT.

Addresses," "The Happy Life," "Educational Reform," "American Contributions to Civilization and Other Essays," and "Manual of Inorganic Chemistry."

ELIOT, George, the literary name assumed by Marian Evans, celebrated novelist, born in Warwickshire, England, Nov. 22, 1819; died in London, Dec. 22, 1880. She was the daughter of Robert Evans, a land agent and surveyor, and a man of strongly marked traits of character. At the death of her mother, in 1836, she assumed management of the house. Her school training was received at Nuneaton and Coventry, though her culture was largely self-acquired through a passionate habit of reading and study. She removed with her father to Coventry in 1841, where she made the acquaintance of Charles Bray, an author of several standard works in philosophy, and formed a close friendship with his family. Soon after the death of her father, in 1849, she traveled through Switzerland, and, returning to England, began to write for the *Westminster Review.* Her writings attracted the attention of John Stuart Mill, Herbert Spencer, and George Henry Lewes, who gave them favorable mention. She formed an irregular marriage union with the last mentioned, which remained unbroken until his death in 1878. His decease was largely the cause of her withdrawal from the conventional forms of society, and, perhaps prompted her to give a larger share of attention to literary work.



GEORGE ELIOT.

Among the best works of George Eliot are her translations from the German, in 1846, of Strauss's 'The Life of Jesus" and "The Essence of Christianity." After completing these works, she declared herself highly interested in the beautiful story of the former. Several sketches contributed by her to *Blackwood's Magazine* in 1857 attracted much attention. Two years later her novel of real life, "Adam Bede," gave her a reputation for masterly insight into character and remarkable knowledge of human nature, combined with much power of description. This work fixed her place among the eminent novelists, and still remains the most popular of her productions. Soon after appeared "The Mill on the Floss," "Silas Marner," "Romola," "Felix Holt," "Middlemarch," "Daniel Deronda," and "Impressions of Theophrastus Such." Among her poetical works are "The Legend of Jubal," "The Spanish Gypsy," and "Agatha." Her productions in poetry are quite equal to her prose, though the prose writings contain greater power of imaginative creation and a more delicate finish. In 1880 she married John Walter Cross, an intimate friend, but died soon after. An extensive biography, entitled "George Eliot's Life as Related in Her Letters and Journals," was published by him shortly after her death.

ELIOT, John, eminent minister, born in Hertfordshire, England, in 1604; died in Roxbury, Mass., May 20, 1690. He was educated at Cambridge, where he obtained a bachelor's degree in 1623, and in 1631 emigrated to America. He officiated for a year in the first church of Boston, and in 1632 received an appointment as pastor of the church in Roxbury, where he remained until his death. He became interested in studying the Indian language by means of an interpreter, and in 1646 was able to preach the gospel to the Indians in their own language. His success in interesting these people attracted attention in England and occasioned several allowances to support him in his efforts. While engaged in his ministerial work, he made a translation of the Bible into the Indian language, completing the New Testament in 1661 and the Old Testament two years later. The "Indian Version of the Scriptures," published at Cambridge, Mass., was the first book printed in New England. About 3,500 Indians were converted to Christianity through the vigorous work of Eliot, though the ill feeling which developed against the English during King Philip's War, in 1675, caused many to fall back into their old ways. Eliot was acknowledged as a man of excellent temper, simplicity of life, and much goodness. Numerous works on Christianity, logic, and Indian history were published by him.

ELIOT, Sir John, statesman, born at Port Eliot, England, April 20, 1592; died Nov. 27, 1632. He was the son of a country gentleman, received a liberal education, and traveled extensively through France, Germany, and Italy. At the early age of 22 he entered Parliament, and when 27 was appointed vice admiral of Devon. He was again elected to Parliament in 1624 as a supporter of the Duke of Buckingham, but soon after became at variance with him, owing to the close friendship of the duke with Charles I., who refused to acknowledge that in the House of Commons is vested the principal ruling power of the nation. The vigorous and able statesmanship of Eliot made him the leader of Parliament against the encroachment of the king, and secured the adoption of its policy and the impeachment of Buckingham. He was imprisoned in the Tower for nine days on account of his persistent opposition in this struggle against the claims of the house of Stuart, but in 1628 the House of Commons wrung from the king the second charter of liberty, the right of petition, mainly through his vigorous agitation. By this charter the king gave up all claim to the power of levying taxes

and was denied the authority to imprison a subject at will, as well as the right to quarter soldiers in any house without the consent of the owner. After a short time Charles I. disregarded the charter. Eliot was again sent to the Tower in 1629, where he remained until his death.

ELIOT, Samuel, historian and educator, born in Boston, Mass. Dec. 22, 1821; died Sept. 15, 1898. He graduated at Harvard in 1839, traveled in Europe four years, and in 1856 became professor of history and political science at Trinity College. He was its president in 1860-66, and in 1864-74 lectured on constitutional law and political science in the same institution. In 1870-73 he was professor in Harvard, served as master of the Boston Girls' High School in 1872-76, and was superintendent of the Boston public schools in 1878-80. He was overseer of Harvard in 1866-72, serving as president of the American Social Science Association about the same time. His power as a teacher and lecturer had a marked influence upon the schools of Boston and the State of Massachusetts, and as an educator of America he takes very high rank. Among his publications are "History of Liberty," "Manual of United States History," "The Early Christians," "The Monarchical Ages," and "The American Nation."

ELISHA (ē-lī'shà), a prophet of Israel, successor of Elijah, who prophesied a period of 55 years. He was consecrated to the sacred office by having the mantle of Elijah thrown over his shoulders, as the former was taken up into heaven. He divided the Jordan while on his way to Jericho. When children laughed at him for his bald head, while on the road to Bethlehem, he cursed them and they were devoured by two she bears. Among the miracles ascribed to him are those of prediction, the healing of the sick, and even the raising of the dead, though he is regarded inferior to his predecessor. His death is commonly assigned to the year 840 B. C. The history of his life is given in II Kings.

ELIZABETH (ē-lĭz'à-bĕth), a city of New Jersey, county seat of Union county, on Staten Island Sound, four miles southwest of Newark. It is on the Pennsylvania, the Central of New Jersey, and several electric railroads. The noteworthy buildings include the county courthouse, the post office, the public library, and a number of churches, schools, and hospitals. It is important as a shipping point of coal, iron, and merchandise. Among the principal manufactories are those producing cordage, sewing machines, ironware, railroad cars, machinery, fertilizers, and sailing vessels. The surrounding country is fertile and produces large quantities of cereals, fruits, and live stock. It has gas and electric lighting, waterworks, sewerage, and a growing wholesale trade. The place was settled in 1609 by representatives of the East India Company. In the Revolutionary War it was the scene of a battle, and was made the point for exchanging prisoners during that period. It was chartered as a city in 1855. Population, 1905, 60,509; in 1910, 73,409.

ELIZABETH, Queen of Rumania, born in Neuwied, Germany, Dec. 29, 1843. Her father, Prince Herman of Wied, gave her a liberal education, and, after reaching her twentieth year, she spent five years in European travel. On Nov. 15, 1869, she married Karl, Prince of Hohenzollern, who was crowned King of Rumania on May 22, 1881. During the wars waged for the throne by her husband she was the Florence Nightingale who hovered in the rear of the army to relieve those in distress. After her husband ascended the throne, she made strenuous efforts for the welfare of the people, and through her influence schools, asylums, and charitable institutions of all kinds were established. As a writer she is known by the name of Carmen Sylva. Most of her books are in the German. Besides translating numerous works from the older Rumanian, she wrote several novels and made a valuable collection of poems. Among her best known works are "My Rest," "Tales of the Carpathians," and "Life of Carmen Sylva." She died March 2, 1916.

ELIZABETH, Empress of Austria, wife of Francis Joseph, born Dec. 24, 1837; assassinated Sept. 10, 1898. She was the second daughter of Duke Maximilian Joseph, who belonged to the Wittelsbach family, which formerly held sovereign title over several German states. Her education was liberal in every detail, and she acquired skillful use of all the languages of civilized Europe, was able to speak all the dialects of Austro-Hungary, and attained much knowledge of ancient Greek. She is classed as the most highly accomplished queen of the last century. Her assassin, an Italian anarchist calling himself Luccheni, gave no other reason for his rash act than that he loved the poor and hated the rich.

ELIZABETH, Queen of England, daughter of Henry VIII. and Anne Boleyn, born at Greenwich, Sept. 7, 1533; died March 24, 1603. She was declared heiress to the crown shortly after her birth. However, in her third year her mother was beheaded and both she and her sister Mary were declared bastards, but she was finally placed in the order of succession after Prince Edward and the Lady Mary. When Edward VI. ascended the throne, she



QUEEN ELIZABETH.

was placed in care of Catharine Parr, the queen dowager, and later was taken to Hatfield, where she obtained a classical education under such eminent teachers as William Grindal and Roger Ascham. Besides learning the arts of music and attaining high skill in science, she learned to converse freely in German, French, Latin, and Greek. As a matter of self-defense she manifested zealous adherence to the Roman Catholic faith, though her inclination to Protestantism was generally suspected. Immediately after the death of Mary, Nov. 17, 1558, she was recognized queen by Parliament amid much rejoicing of the Protestants and with the approval of moderate Catholics. Her ascent was followed by the reëstablishment of the ecclesiastical system devised during her father's reign, and the act of uniformity enforced the revised prayer book. She declared her intention to live and die a virgin, though she was approached by Parliament on the serious question of the succession to the crown and had numerous suitors, among them Eric, King of Sweden, Philip of Spain, Henry III. of France, and Archduke Charles of Austria.

The reign of Elizabeth ranks among the shrewdest and most important in English history. To the wisdom she exercised in engaging as her advisers the ablest men of the kingdom is due largely the growth of Great Britain into a world power. Among the unfortunate events may be named the jealousy that existed between her and Mary, Queen of Scots, which resulted in the beheading of the latter, and the many persecutions to which the Catholics were subjected. On the other hand are numerous facts of history that make her a most distinguished character for influence and power. Among them may be named the destruction of the Spanish Armada in 1588; extensive influence at the courts of France, Holland, and other countries, making her a potent factor in the political affairs of Europe; and vast strides of advancement in architectural arts and commercial relations.

The Elizabethan architecture is an outgrowth of the inferior Gothic and Italian. Though not particularly preferable, it met the wants of an advancing civilization and was far superior to the styles formerly employed extensively in England. In her youth she was described as a maid of auburn hair and delicate white hands, but with manners and face almost masculine. A description made of her at 65 years related that she wore false red hair, a white silk dress bordered with pearls, earrings of large pearls and profuse decorations of gold and diamonds. In the affairs of government, abroad and at home, she was supported by such men as Bacon, Burleigh, and Walsingham.

ELIZABETH, Saint, daughter of Andreas II., King of Hungary, born in Presburg, Austria, in 1207; died in Marburg, Germany, Nov. 19, 1231. She was affianced to Louis IV., landgraf of Thuringia, at the age of four, brought up in the family of her future husband's parents, and married at the age of fourteen. Her husband died while engaged as a Crusader at Otranto under the leadership of Barbarossa, after which she devoted her life exclusively to religion and charity. Pope Gregory I. placed her in the list of saints four years after her death. Her fame for goodness, purity, and devotion to the service of God shines with a luster of remarkable brightness, while many are the stories of the suffering and distress she relieved while in the service of her Master.

ELIZABETH CITY, a city in North Carolina, county seat of Pasquotank County, on the Pasquotank River, forty miles south of Norfolk, Va. It is on the Norfolk and Southern and other railroads. The chief buildings include the high school, the customhouse, and the State normal school. It has a good harbor and a large trade in cotton, oysters, fish, and tobacco. Among the manufactures are cotton textiles, flour and grist, wagons, brick, lumber products, and machinery. Oysters are cultivated in the vicinity. It has systems of public sewerage and lighting. Settled in 1793, it was incorporated the same year. Population, 1910, 8,412

ELIZABETH ISLANDS, a group of sixteen islands between Vineyard Sound and Buzzard's Bay, belonging to Dukes County, Massachusetts. Naushon has an area of eight square miles, is the largest of the group, and contains handsome private and summer residences. John Anderson gave Penikese, an island of this group, with an endowment of $50,000 to Louis Agassiz, in 1873, for conducting a summer school, though the institution has since been discontinued. In summer the islands are visited by tourists and pleasure seekers. Population, 1917, 164.

ELIZABETH STUART, Queen of Bohemia, daughter of James I. of England, born Aug. 19, 1596; died Feb. 13, 1662. On Feb. 14, 1613, she married Frederick V., the German elector-palatine, who was elected to the throne of Bohemia by the German princes. Through her the Stuarts inherited the throne of England.

ELK, or **Moose Deer,** the largest living species of the deer family, native to Europe and Asia. It stands, when full grown, about six feet and in weight averages about 1,000 pounds. The neck is very short and thick, adapting the animal for draft purposes. In all species the head is large, fully two feet long, and crowned with prominent horns, which branch out almost from the base into a broad, palmate form, with numerous snags. A single antler frequently weighs fifty or sixty pounds. The limbs are long and quite graceful. A fully developed elk will draw a sledge more than 200 miles a day, the gait being a shambling trot. The elk is timid and inoffensive, except when wounded, when it becomes aggressive. A single, well-directed

stroke of its forefoot is sufficient to kill the largest dog. The flesh is esteemed a good kind of venison and is much sought as an article of food.

The so-called American elk does not belong to this class of animals, since it more nearly resembles the red deer, and the proper name is Wapiti (q. v.). Occasionally one of these animals is seen in the northern part of the United States, but they are fast disappearing even in Canada. They inhabit marshy and dense timber regions and live separately, except during the rutting season. The Irish elk, which is now extinct, was closely allied to the fallow deer. Remains of it are found occasionally in the bogs and caves of the British Isles and the western part of Europe. This animal was remarkable for its large antlers, which in some specimens measured as much as eleven feet from tip to tip.



WAPITI, OR AMERICAN ELK.

ELKHART (ĕlk'härt), a city of Indiana, in Elkhart County, at the confluence of the Saint Joseph and Elkhart rivers, 98 miles east of Chicago, Ill. It is on the Lake Shore and Michigan Southern and other railroads, and is surrounded by a fertile agricultural country. Among the noteworthy buildings are the Carnegie library, the high school, the city hall, and the Elkhart Institute. The principal manufactures include paper, starch, musical instruments, machinery, carriages, flour, and brass novelties. It has extensive railroad machine shops and other industries. The streets are well graded and paved, principally with brick, and the municipality has systems of sewerage and lighting. It is the center of a large trade in produce and merchandise. Population, 1910, 19,282.

ELKHORN, a river of Nebraska, rises in Rock County, flows in a general southeasterly direction, and joins the Platte River about 20 miles west of Omaha, after a course of 250 miles. The valley of the Elkhorn is noted for its fertility. It contains numerous enterprising towns and cities.

ELKINS, county seat of Randolph County, West Virginia, on the Western Maryland and other railways. It has extensive machine shops, planing mills, tanneries, and wholesale trade. The features include the courthouse, high school, and Y. M. C. A. building. It was settled in 1889. Population, 1910, 5,260.

ELKINS, Stephen Benton, statesman, born in Perry County, Ohio, Sept. 26, 1841; died Jan. 4, 1911. He studied in the schools of Missouri and graduated from the State University of Ohio. He was elected to the United States Senate in 1894, in 1900, and in 1906.

ELKS, Benevolent and Protective Order of, a benevolent and fraternal society founded in 1868 in New York City. It is the outgrowth of a social club known as the Jolly Corks, a society of members of the theatrical profession, and its purposes are social and philanthropical. The largest membership is in the United States, where the order has about 950 subordinate lodges with a membership of 250,000. Eligibility to membership is limited to white male citizens of the United States of good moral character, 21 years of age, and subordinate lodges are not permitted in cities that have a population less than 5,000. This order has many fine buildings in the larger cities. Its official organ, the *Elks-Antler,* is a monthly publication.

ELLESMERE LAND (ĕlz'mēr), the name of a large tract of land in the Arctic region of North America. It is located north of Jones Sound and west of Greenland, from which it is separated by Smith Sound. It is part of the northernmost region of the Western Hemisphere and consists chiefly of a barren and uninhabited plateau. William Baffin visited it in 1616, and it was partly explored in 1899, when it was found that Hayes Sound does not separate it from Grinnell Land, which lies immediately north.

ELLET (ĕl'let), **Charles,** civil engineer, born in Bucks County, Pennsylvania, Jan. 10, 1810; died June 21, 1862. He studied mathematics and mechanics, first as a rodman under competent surveyors, and afterward took a course of instruction in France. Subsequently he was made chief engineer of the James River and Kanawha Canal. His first work to attract much attention was the construction of a wire suspension bridge, the first in America, which was built across the Schuylkill River in Philadelphia in 1842. In 1848 he built a span of 960 feet across the Ohio River at Wheeling, and soon after made the original plan for the suspension bridge across the Niagara. In the Civil War he rendered valuable service to the Union cause by carrying out important engineering work. His skill caused the Mississippi gunboat flotilla to be protected and many Confederate vessels to be destroyed, and facilitated the capture of Memphis. He was wounded by

a musket ball at Memphis, which, together with impaired health caused by arduous labors, resulted in his death at Cairo, Ill. His publication, "Coast and Harbor Defenses," has served a very useful purpose.

ELLIOTT (ĕl'ĭ-ŭt), **Jesse Duncan,** naval officer, born in Maryland in 1782; died Dec. 18, 1845. He studied at Carlisle, Pa., and in 1804 joined the United States navy as a midshipman. In the War of 1812 he won several successes for the Americans on the Great Lakes. He was second in command to Perry in the Battle of Lake Erie in 1813, and the same year succeeded to the command of the Lake Erie fleet. In 1815 he commanded the sloop of war *Ontario* under Decatur in the war against Algiers, and three years later was raised to the rank of captain. He commanded the *Constitution* in the Mediterranean squadron for several years, and in 1840 was suspended from duty for four years, after having been tried by court-martial.

ELLIPSE (ĕl-lĭps'), an important figure in geometry. It is a plane curve, the sum of the distances of two straight lines drawn to two fixed points within the curve being always the same. These two points are called the *foci,* each being a *focus.* The diameter drawn through them is the major axis; the minor axis bisects the major at right angles. The distance from the center to the foci divided by the semimajor axis is called the *eccentricity* of an ellipse. The less the eccentricity, the nearer the figure approaches a circle. Kepler made the discovery that the planets' orbits around the sun are ellipses, the sun occupying a position in one of the foci.

ELLIS (ĕl'lĭs), **George Edward,** historian and author, born in Boston, Mass., Aug. 8, 1814; died Dec. 21, 1894. He graduated at Harvard and studied at the Divinity School, and was ordained a minister. In 1840 he became pastor of the Harvard Unitarian Church at Charlestown, Mass., and was professor of systematic theology in the Harvard Divinity School in 1857-63. He contributed to many periodicals and published a number of books, principally biography and history. His writings include "Memoirs of Jared Sparks," "Half Century of Unitarian Controversy," "History of the Battle of Bunker Hill," and "The Puritan Age and Rule in the Colony of Massachusetts."

ELLSWORTH (ĕlz'wûrth), **Ephriam Elmer,** soldier, born in Mechanicsville, N. Y., April 13, 1837; died May 24, 1861. He removed to Chicago at an early age and became colonel of a zouave regiment organized by him from volunteer firemen of New York. He was stationed at Alexandria, Va., where he was shot and killed by a hotel keeper while in the act of tearing a Confederate flag from the building. The people of the North regarded him the first martyr of the Union cause, and he was buried with military ceremonies from the White House, in Washington.

ELLSWORTH, Oliver, statesman and jurist, born in Windsor, Conn., April 29, 1745; died Nov. 26, 1807. He studied at Yale and Princeton, was admitted to the Connecticut bar, and in 1775 became a member of the Connecticut Legislature. He was elected to the Continental Congress in 1778, where he distinguished himself in state affairs and as an advocate of the American cause. In 1787 he was chosen to represent his State in the Constitutional Convention, in which he advocated a Congress of two houses, the upper based upon equality between the states and the lower to be constituted of representatives according to population. He was elected United States Senator in 1789, and in 1796 became Chief Justice of the Supreme Court, serving until 1799, when he was made a commissioner to settle disputes between France and the United States.

ELLWOOD (ĕl'wo͝od), **Thomas Crowell,** author, born in Oxfordshire, England, in 1639; died Mar. 1, 1713. He became a minister of the Society of Friends. In 1662 he was chosen reader to Milton, who is said to have written "Paradise Regained" on the suggestion of Ellwood. His writings include a number of controversial works and several biographies. They include "Forgery on Christianity," "Autobiography," "Sacred Histories of the Old and New Testaments," and a poem entitled "Davideis."

ELM, a genus of trees which includes thirteen well-marked species, all native to the North Temperate Zone. In most species the branches are numerous and spreading, the bark is rugged, and the leaves are alternate, ovate, and doubly serrate. The flowers are small, but numerous and in clusters, and the fruit is either a small, one-sided nut, forming a winged samara, or a drupe. Elm wood is compact and very durable in water. The trees commonly grow to the height of 60 to 100 feet, and in some cases as high as 150 feet. Wagon hubs and ship locks are made of the wood of the white elm, which is also largely taking the place of oak in the manufacture of the cheaper grades of furniture. The *slippery* or *red elm,* a native tree of America, contains a mucilaginous inner bark, while the *wych elm,* or *wych hazel,* is indigenous to Europe. Another species is the *weeping elm,* which is the most ornamental of the genus. The old white elm tree of the Boston Commons, destroyed by a storm on Feb. 15, 1876, measured 22 feet in circumference. See illustration on following page.

ELMIRA (ĕl-mī'rà), a city of New York, county seat of Chemung County, on the Chemung River. It is on the Pennsylvania, the Lehigh Valley, the Erie, and the Lackawanna railroads and is the focus of several electric lines. The streets are regularly platted, crossing each other at right angles, and are improved by grading and paving. Among the noteworthy buildings are the post office, the courthouse, the public library, and the city

hall. The public school system culminates in an excellent high school course and is supplemented by Elmira College, an institution having an endowment of $250,000. Among the charitable institutions are an industrial school, an orphanage, a home for the aged, the Arnot-Ogden Memorial Hospital, and the Anchorage. It is the seat of the State reformatory.

Elmira is important as a market and an industrial center. The manufactures include clothing, silk and woolen goods, engines and boilers, boots and shoes, steel plate, cigars, and machinery. It was settled in 1788 and incorporated in 1815. During the Civil War it had a Federal prison in which many Confederates were confined. Population, 1910, 37,176.

ELMO'S FIRE, Saint, the popular name of a meteoric appearance seen during thunder storms at the tops of masts and other pointed objects. It is more frequent in southern than in northern climates, and is due to currents of electricity. It appears either as one or two



ENGLISH ELM. SLIPPERY ELM.

flames. The former phenomenon, known as Helena, is regarded a bad omen by sailors, while the latter, called Castor and Pollux, is looked upon as a good sign.

ELORA (ĕl-lō'rà), or **Ellora,** a village of Hindustan, near Dowlatabad, celebrated on account of its remarkable temples hewn in rocks. These temples number about 35, some of which are cave temples, while others consist of excavations in higher strata of rock. Many of the larger structures are about 150 feet wide and 275 feet long, and are adorned by sculptures, sphinxes, and obelisks cut from solid granite. The caves are thought to have been constructed in the 7th century.

EL PASO (ĕl pă'sō), a city of Texas, county seat of El Paso County, on the Rio Grande. It is on the Southern Pacific, the Mexican Central, the Texas Pacific, and the Atchison, Topeka and Santa Fé railroads. The site is 3,830 feet above sea level, with a mean annual temperature of 63° Fahr., and the surrounding country has large interests in stock raising and general farming. Among the noteworthy buildings are the county courthouse, the high school, the Hotel Sheldon, the Federal building, and several private schools and hospitals. The streets are well paved and drained. It has a sewer system, gas and electric lighting, and electric street railways. The industries include smelting, cigar making, and machine shops. El Paso was settled in 1827 and incorporated in 1869. Near the city is a United States military post. Population, 1900, 15,906; in 1910, 39,279.

EL RENO, county seat of Canadian County, Oklahoma, on the Canadian River, 25 miles west of Oklahoma. It is on the Chicago, Rock Island and Pacific and other railroads. The surrounding country is fertile. Among the chief buildings are the high school and the county courthouse. It has manufactures of flour, earthenware, and machinery. The city maintains a system of waterworks and has electric lighting. Population, 1910, 7,872.

ELVES, the term applied to the mythical spirits supposed to inhabit wild and desolate places, and in various ways to exercise a mysterious power over man. See **Fairies.**

ELWOOD (ĕl'wo͝od), a city of Indiana, in Madison County, 37 miles northeast of Indianapolis. It is on the Pittsburg, Cincinnati, Chicago and Saint Louis and the Lake Erie and Western railroads. Natural gas is obtained in the vicinity. The chief buildings include the county courthouse, the high school, and the public library. It has gas and electric lighting and electric street railways, and is a growing market for cereals and live stock. The manufactures include glass, machinery, cigars, and clothing. The municipality maintains systems of sewerage and waterworks. Population, 1900, 12,950; in 1910, 11,028.

ELY (ē'lĭ), a town in the county of Cambridge, England, on the Ouse River. It has a superb cathedral founded by Etheldreda, daughter of the King of East Anglia, about the year 673. This building was burned by the Danes in 870, rebuilt as a Benedictine abbey in 970, and greatly enlarged after the first Norman conquest. It includes different parts which are built in the various styles of architecture that prevailed in Britain from the Conquest to the Reformation, is 517 feet long, and has a tower 275 feet high. The town is surrounded by a gardening district which produces vegetables for the markets of Cambridge and other cities. It was the last stronghold of the Saxons after the Conquest. Population, 1917, 8,471.

ELY, Richard Theodore, political economist, born in Ripley, N. Y., April 13, 1854. He studied at Dartmouth and Columbia colleges, took advanced courses at Heidelberg, Germany, and was professor of political economy at Johns Hopkins University in 1885-92, after which he

secured an appointment as professor of political economy in the University of Wisconsin. He is recognized as one of the leading authorities on economic questions in the United States, and is the author of many books on political and social questions. Some of his theories have been criticized as antagonizing much that is desirable in our social system. However, from these charges he was exonerated officially by the authorities of the University of Wisconsin. Among his best known works are "French and German Socialism of Modern Times," "Labor Movement in America," "Recent American Socialism," "Coöperation in America," "Introduction to Political Economy," "Socialism and Social Reforms," "Taxation in American States and Cities," "Social Aspect of Christianity," and "Monopolies and Trusts."



RICHARD T. ELY.

ELYRIA (ē-lĭr'ĭ-ȧ), county seat of Lorain County, Ohio, about seven miles south of Lake Erie, on the Black River. It is on the Baltimore and Ohio and the Lake Shore and Michigan Southern railroads, and is surrounded by an agricultural and dairying country. The chief buildings include the county courthouse and the public library of 17,500 volumes. Sandstone is quarried in the vicinity and shipped in large quantities. The manufactures include clothing, cheese, tobacco, machinery, and confectionery. It has pavements, electric lighting, and a large trade in produce. Population, 1910, 14,825

ELYSIUM (ē-lĭzh'ŭm), or **Eylsian Fields,** in mythology, the place in which the souls of the blessed were supposed to dwell after death. The Orientals and most other peoples considered this abode to be in the upper regions of the sky, but the Greeks located it in the west, or beneath the earth, where the sun goes down. Homer described it as the Isle of the Blessed, where men live without toil or care, where snow and winter's storms are unknown, where the lovely and cooling zephyrs blow unceasingly with light murmur, and where the favorites of the gods are carried when passing from this life. He thought that Rhadamanthus, the most just of men in the upper world, alone ruled Elysium. Hesiod speaks of the happy isles of the ocean, but Pindar and the later poets put it beneath the earth.

ELZEVIR (ĕl'zę-vĭr), the name of a celebrated family of Dutch printers, famous for their editions of classical and historical works. Louis Elzevir founded the reputation of the family as printers in 1583, and he was succeeded by his seven sons. Abraham Elzevir (1681-1712), university printer of Leyden, is the last of these celebrated printers. The books issued are noted especially for the fine grade of paper and elegance of the types. They include 10 in Italian, 11 in German, 32 in Flemish, 44 in Greek, 126 in French, and 968 in Latin.

EMANCIPATION (ē-măn-sĭ-pā'shŭn), the liberation from bondage, applied in American history especially to the release of the negroes from slavery. The early constitution framed in Vermont abolished slavery in 1777 and Massachusetts did likewise in 1780. Acts of gradual emancipation were passed by Pennsylvania in 1780, New Hampshire in 1783, Rhode Island in 1784, Connecticut in 1784, New Jersey in 1804, and New York in 1799, though in the last-mentioned State an act of absolute emancipation took effect July 4, 1827. Slavery was permitted in the remainder of the colonies, and in the case of new states the question was settled at the time of admission. Soon after the Civil War commenced President Lincoln was urged by northern abolitionists to abolish slavery by proclamation. As early as 1862 laws were passed abolishing slavery in the territories, freeing escaped slaves of persons in rebellion, and abolishing slavery in the District of Columbia, the owners receiving compensation.

The Northern States entered upon the war to maintain the Union, not to liberate slaves. On Aug. 22, 1862, President Lincoln stated: "My paramount object is to save the Union, and not either to save or destroy slavery. If I could save the Union without freeing one slave I would do it; if I could save it by freeing all the slaves I would do it; and if I could save it by freeing some and leaving others alone I would do that." As the war progressed it became evident that slavery was a source of much military strength to the seceded states, and freeing them was decided on as a war measure. President Lincoln issued a proclamation on Sept. 22, 1862, in which the seceded states were notified that unless they returned to their allegiance by Jan. 1, 1863, he would declare their slaves forever free. Since the states in rebellion did not heed the notice, the Emancipation Proclamation followed on Jan. 1, 1863, by which all slaves in these states were declared free. It was given effect as rapidly as the Federal troops secured control of the territory held by the Confederates. In the proclamation the President declared it an act of military necessity, enjoined the freed slaves to abstain from violence, and offered to engage them in the military and naval service.

EMANUEL I. (ĕm-ăn'ū-ĕl), King of Portugal, called the Great, born May 3, 1469; died Dec. 13, 1521. He succeeded John II. in 1495 and at once entered upon a vigorous reign, which became known as the golden age of Portugal. The code of laws that bears his name was prepared by him, under which edu-

cation was extended and internal improvements were fostered, and Portugal was made the first naval power of Europe, as well as the commercial center of the world. It was in his reign that Vasco da Gama sailed round the Cape of Good Hope and made valuable discoveries in India, while Cabral was dispatched on the expedition in which he discovered Brazil, and Albuquerque and other noted navigators added valuable foreign territory. At the time of his death Portuguese colonies, military strength, commercial enterprise, and internal improvements were at their highest state of prosperity.

EMBALMING (ĕm-bäm'ing), the art of preserving the dead bodies of men and animals. There are many evidences that the art was practiced extensively in ancient Egypt, where the process was known at least 4,000 years B. C., this being evidenced by the embalmed bodies of Cheops and other sovereigns of the early dynasties. The origin of embalming is ascribed by the Egyptians to Anubis, who embalmed his father, Osiris. One of the earliest records of embalming is that of the patriarch Jacob. We learn from reliable sources that the body of Joseph was thus prepared and transported out of Egypt. The practice prevailed, though not so extensively, among the nations of Asia and in Greece and Rome. Usually the bodies of the poorer classes were dried in the sand or washed in myrrh, and then salted for a period of seventy days.

Embalming among the middle classes consisted of removing the brain and soaking the corpse in a solution of natron, which destroyed the viscera and soft portions, leaving practically only the skin and bones. The wealthy frequently paid $3,000 for the embalming of a single body, the process being nearly the same as among the middle classes, except that the corpses were swathed in linen bandages saturated with gum, and perfumed with aromatic substances. Within and about the bodies of different mummies have been found sulphate of soda, saltpeter, salt, soda, oil of cedar, turpentine, asphalt, myrrh, and cinnamon. Extended knowledge of the use and effect of chemicals has led to the employment of various compounds that are effective in artificial embalming, such as arsenic, sulphate of zinc, corrosive sublimate, and spirit compounds. They are forced into the blood vessels and cavities soon after death ensues, or the body is immersed for some time in spirits. At present the corpses are embalmed chiefly to prevent contagion, to make transportation less dangerous, and to overcome the necessity of immediate burial. See **Mummy.**

EMBARGO (ĕm-bär'gō), a prohibition by government authority of the departure of ships or merchandise from some or all its ports. It is either *hostile* or *pacific,* the former having reference to the detention of vessels of a foreign country and the latter to its own vessels. A hostile embargo is declared either as a means to settle a dispute or to make a reprisal, while a pacific embargo is laid as a public policy or to protect the merchant vessels of a neutral nation. The first general embargo was laid by the United States in 1794. It was effective upon all vessels for sixty days, and was laid as a retaliatory measure against the British orders in council dated June 8, 1793. At the time of the War of 1812 another embargo was laid, in 1813.

EMBER DAYS, certain days in each of the four seasons set apart for prayer and fasting, one theme for supplication being that the blessings of God may descend on the crops. They are the Wednesday, Friday, and Saturday after the first Sunday in Lent, after Whitsunday, after the 14th of September, and after the 13th of December.

EMBOSSING (ĕm-bŏs'ĭng), the art of producing raised figures upon plain surfaces, such as paper, leather, bronze, and wood. In the two last mentioned the figures are said to be in *alto-, mezzo-,* or *bas-relief,* according to whether they are more or less prominent. Paper, leather, and the textile fabrics are embossed by powerful presses, in which the dies give their pattern to the object to be embossed. Steam is employed to keep the plate at a suitable temperature, depending upon the material to be embossed, and the power is applied by a treadle to straighten a bent arm, as in the old form of the printing press. Wood to be embossed is softened by steam and the impressions are made by iron molds into which it is forced. Metal is embossed largely by hand, the workman beating it up from the under side, and this method is called *repoussé work.* In embossing textile fabrics, it is done largely as needle work embroidered over figures padded with various materials, such as wool felt.

EMBROIDERY (ĕm-broid'ĕr-ў), the name applied to ornamental needlework produced upon fabrics of any kind. Its production was one of the most important of the early arts in Oriental countries, and it is still practiced with much skill and diligence, the best work being done upon silk. The figures are either in colored silk or in threads of silver and gold. They consist of men, horses, dragons, etc., and are outlined with gold and filled with shades of silk, though sometimes are ornamented with beads, spangles, pearls, and precious stones. The fabric is stretched usually on a frame, with the design to be worked drawn upon it, or some other contrivance is used to guide the worker.

From the earliest times embroidery has been used to decorate the sacerdotal vestments, but it likewise has served other ecclesiastical uses. In modern times it has been employed to a large extent in women's dresses and undergarments. The Jews derived their skill in producing embroidery from the Egyptians. It ap-

pears to have been a common art, since even barbarous tribes were skilled in making showy designs upon cloth and other fabrics, using both linen and wool for the purpose. Many of the nomadic tribes of Asia and Africa still practice it as a domestic art. The process of doing embroidery work, even in modern times, employs simple tools and the work is largely by hand. They consist chiefly of needles of different sizes and scissors to cut the thread. The thread left on the surface of the cloth after each ply of the needle is called a *stitch.* The stitches differ in accord with the work to be done and include principally those known as the cross, darning, running, crewel, feather, rope, cushion, buttonhole, chain, canvas, and couching stitches. Various machines for making embroidery are now in use.

EMBRYOLOGY (ĕm-brĭ-ŏl'ŏ-gy), that branch of biology which treats of the formation of organisms. The study of this division of learning as a science dates from the last century, though Aristotle, Galen, and Harvey considered the subject and laid the foundation for the recent embryologists. The epoch of life in placental mammals, to which the study of embryology ordinarily is limited, extends from the time of conception to the period at which the anatomical connection between the young and mother is severed, though in a general sense it embraces the entire period from conception to the attainment of the perfect form. By *conception* is meant the *fertilization* of the ovum, which takes place through a spermatozoön, or male germ cell, penetrating into it, both in animals and plants. However, there are radical distinctions that give rise to divers limitations.

In most fishes and some other animals the embryo and parent have no anatomical connection, while fertilization of the ovum in many of these is effected outside the female. In oviparous animals the female retains the ovum within the body for some time after fecundation, where it is retained in a condition largely independent of the maternal body, though securing from it heat and protection. After a definite number of eggs have been ejected, the mother begins external incubation, which is continued until the young life bursts from the shell. However, a filial relationship exists after incubation by reason of which the new life is supplied with protection and food, while in other animals the lacteal function of the mother supplies the helpless young with support quite as vital as the nourishment previously extended through the placenta.

The laws announced by Rudolf Virchow (q. v.) and Karl Ernst von Baer (1792-1876), two German scholars, form the basis of study in modern embryology. The laws of the former imply that the organs and cells of new life forms originate primarily from cells deposited in the ovulum and gradually become complex through cell divison and cell specialization, or the physiological division of labor. Von Baer's law maintains that the form primarily assumed by an individual in the process of development is similar to that assumed by many types, later its organism becomes more specialized and, when fully developed, stands wholly apart from parallel types. Thus, the process of development leads to the special from the general, to the heterogeneous from the homogeneous.

Herbst explains the whole process of embryonic development by asserting that the protoplasm responds in a very intricate way to its surroundings; that it depends upon physiological responses to stimulations that come from without; in other words, that the cells and organs in the embryo move and change form in response to various stimuli, especially in eggs containing a considerable quantity of yolk. The yolk being food for the embryo, it is certain that the latter gives off waste products in the process of rapid growth, and later moves away to portions of the yolk not contaminated by such wastes.

It is quite well known that the development of the embryo differs materially in different animals, though in the successive stages there is much analogy, even in the human foetus, to the embryo or adult of the lower life forms. However, in this connection arises the discussion of the theories of *evolution* and *epigenesis.* According to the former theory the embryo exists preformed in the ovum and begins to unfold into the adult as soon as fecundation takes place; while in the latter we find the theory that holds the growth of the embryo to be a process of new formation, the cell mass giving birth to new cells in their own interior by stimulation from without, a view now most generally adopted.

EMERALD (ĕm'ẽr-ạld), a variety of beryl, being distinguished in having an emerald-green color, in place of pale green, light blue, yellow, or white hues, which are the colors of the beryl. The emerald green of this gem is produced by the presence of chromium. Jewelers obtain the finest emeralds from Peru, but fine species are found in other places of South America, and an inferior quality is native to Europe. The emerald is usually in the form of a prism, and is most valuable when the surface is perfectly straight and smooth, so as to cast no darkening shadow on any of its particles. It is one of the softest of the precious stones, but acids will not affect it. Emeralds are cut on a copper wheel with emery dust, and polished on a tin wheel with rotten stone. As a gem it is considered inferior only to the diamond and ruby.

EMERALD ISLE, the popular name of Ireland, applied to it on account of the rich green color of its vegetation. It came into general use through Dr. Drennan (1754-1820), who first used it in his poem entitled "Erin."

EMERSON (ĕm'ĕr-sŭn), **Ralph Waldo,** essayist, philosopher, and poet, born in Boston, Mass., May 25, 1803; died April 27, 1882. He came from a family which had resided in America for three generations, his parents being William Emerson and Ruth Haskins. The greater part of his boyhood was passed in Boston. He graduated at Harvard College in 1821 and later studied theology under the direction of Channing. Soon after he was made pastor of the Second Unitarian Church, Boston, but severed his connection after a brief period on account of holding views respecting the Lord's Supper at variance with his congregation, and afterward he devoted himself to writing and lecturing. He married Ellen Louisa Tucker in 1832, but she died the following year, and he spent two years in Europe, largely with the view of recuperating his health. While in England he became acquainted with Wordsworth, De Quincey, Coleridge, and Carlyle, forming with the last mentioned a personal friendship that influenced the lives of both. In 1835 he married Lidian Jackson, and settled in Concord, Mass., where he made his permanent home, leaving it only when on lecturing tours and for a second visit to Europe.



RALPH WALDO EMERSON.

The life of Emerson was largely that of a literary recluse, owing to the close attention he gave to study and research. His knowledge of the practical affairs of public life was comparatively limited, though he possessed considerable interest in public questions, while his philosophy lacked robustness and thought, at least such as the busy life of his time required. His essays are characterized by charming ideals and ethical beauty. These, together with a wise choice of words, originality in thought, and inspiring tendency, have made for them a permanent place in modern literature. The total collection of Emerson's works embraces twelve volumes, including philosophical and religious writings, poems, essays, and lectures. His lectures include several which relate to the abolition of slavery. Among his best known and popular writings are "Representative Men," "The American Scholar," "Memoir of Margaret Fuller," "Oration on the Death of Lincoln," "Society in Solitude," "Conduct of Life," "Nature: An Essay," "Letters and Social Aims," "May Day and Other Pieces," and "English Traits." With these should be classed "Letters to Thomas Carlyle," a series of letters published posthumously.

EMERY (ĕm'ĕr-ў), a variety of corundum, being allied to the sapphires, the ruby, and other precious stones. It is granular in texture and the hardest substance found native, next to the diamond. Emery is a dense, opaque, dull grayish-black substance, occurring in bowlderlike masses and as granulates in soils. It is found in the islands of the Greek Archipelago, in Asia Minor, at Chester, Mass., and elsewhere. As a powder it is used extensively for cutting and polishing precious stones and for smoothing the surfaces of lenses and plate glass. When employed in this form, it is prepared by first breaking the stone into small lumps, then crushing them into powder by stampers. Emery paper and emery cloth are made by sifting the powder over strong sheets of paper or cloth, after brushing them with liquid glue. Emery wheels are commonly made of wood covered with leather or coarse cloth, with a surface of emery, or a compound of emery and caoutchouc molded into the shape of a grindstone and vulcanized.

EMIGRATION (ĕm-ĭ-grā'shŭn), the removal from one country or region for the purpose of settling or residing in another. Inhabitants leaving a country are called emigrants, while those coming into a country or state are spoken of as immigrants. Among the principal causes that have led to emigration are over-population, political and social discontent, compulsory military service, religious persecution, the desire to attain greater liberty, and the general betterment of industrial conditions. The barbaric tribes of ancient times were induced to migrate and occupy territory more conducive to their arts of warfare and life, while civilized people have migrated more or less for higher purposes, especially to carry the benefits of civilization and religion to remote lands. All of Europe was settled by the over-population that pressed westward from Asia, and later, when the population of European countries became dense, the inhabitants in turn sought newer lands and greater opportunities. The fact that people are governed by certain laws of migration, such as passing to countries having a similar climate, the same natural resources, and an approximately equal altitude, has been well established.

Emigration to America on a large scale began with the departure of the Puritans, who planted colonies in New England. Soon after the Dutch colonized New York, the Germans settled Pennsylvania, the French occupied Canada and Louisiana, the Spaniards made settlements in Florida, and the Swedes established a foothold in Delaware. In 1815 such an extensive breaking-up occurred in Europe that alarm was occasioned, though afterward it became manifest that the emigrants were made up largely of the over-population of various countries. The last century marks the greatest epoch of migration in the world's history, a period in which the

Spanish and Portuguese languages were planted in Central and South America, the English in North America and Australia, and the Dutch, English, German, and French in various portions of Africa, Asia, and the Oceanic islands. Perhaps the planting of language is even overshadowed by the establishment of certain forms of religion, industries, and customs, and the molding of a new civilization. The colonial policy pursued in recent years by the great powers of Europe is tending to direct the overpopulation to various colonies, and thereby to strengthen more and more the foothold that these nations have in regions far remote from the mother country. This is particularly true of the Russians in Asia, and the Portuguese, French, Germans, English, and Italians in Africa.

ÉMIGRÉS (ā-mē-grā'), the name given to the royalists who fled for safety from France during the Revolution of 1789. The movement began shortly after the storming of the Bastile on July 14, 1789, When Prince Condé became alarmed at the course of events and was joined by many nobles in emigrating to Germany and the Netherlands. In October of the same year a concerted attack was made on Versailles, causing the royal family to remove to Paris, and this was followed by a renewal of emigration on a larger scale. The *émigrés* collected an army of 80,000 men at Coblentz under the Duke of Brunswick and the king made a disastrous attempt to join the forces, but was captured on the night of June 20, 1791. Condé and his adherents joined the Prussian army in Champagne, which caused the French government to confiscate their property and to proclaim the death penalty upon many for treason. When Napoleon gained the consulship, they were permitted to return, but the charter of 1814 made it impossible for them to regain their estates or former privileges. In 1825 the government voted to compensate them for the loss of their estates, but this was annulled as a result of the Revolution of that year.

EMINENT DOMAIN (ĕm'ĭ-nẹnt dō-mān'), the supreme right possessed by a country or state to take or control private property for public use without the consent of the owner. This right is justified in all civilized nations because it serves to promote the general welfare. It is not a confiscation of the property, since it is required that full and adequate compensation be made to the owner, and is to a large extent the outgrowth of the feudal system of land tenure in England and elsewhere. The Parliament of Great Britain provides for reasonable compensation to the owner of property taken for public use, but this is done rather as an act of justice than because of legal obligation. In the United States it is a constitutional requirement that no person shall be deprived of property without due process of law, and "private property shall not be taken for public use without just compensation." Nearly all of the states have similar constitutional provisions, and under them, or the statute laws, property may be taken for public use in the same way as it may be taken by the national government. The right of eminent domain is essential and necessary, since otherwise it might become impossible to construct public buildings, highways, canals, and railroads.

EMIN PASHA (ā'mēn pà-shä'), African traveler, whose real name was Eduard Schnitzer, born at Oppeln, Germany, in 1840; slain Oct. 20, 1892. He was educated at Neisse, studied medicine in Berlin, and went to Turkey in 1864, where he became successful as a physician. After learning Arabic and Turkish, he adopted Turkish habits and customs, and assumed the name of Emin, meaning the "Faithful One." Later he accompanied Hakki Pasha on official expeditions through Armenia, Syria, and Arabia, became attached to Ismail, governor of Scutari, and, after the death of the latter, married his widow. He joined the Egyptian service as chief physician in 1876, and two years later was appointed governor of a province by General Gordon. Soon after the troops of the Mahdi cut off his means of communication and surrounded his forces, though he defended himself until an expedition under Stanley came to his relief in the spring of 1888. The following year he was taken prisoner by the natives, but escaped and entered the German service. In 1892 he undertook an expedition to the Congo, where he was captured and murdered. Many European countries bestowed distinguished honors upon him for valuable service in African research.

EMMET (ĕm'met), **Robert,** revolutionist, born in Dublin, Ireland, in 1778; executed Sept. 20, 1803. At the age of fifteen years he entered Trinity College, Dublin, where he was a fellow of Thomas Moore, the poet, and was expelled in 1798 on account of having connected himself with the Association of United Irishmen. Soon after he traveled in Europe, consulted with Tallyrand and Napoleon regarding the Irish cause, and planned a general revolution, devoting his own fortune of $15,000 for the purchase of munitions of war. He attempted to seize the arsenal and castle of Dublin on July 23, 1803, but the attempt failed, his men dispersing after the first volley had been fired. He escaped in safety to the Wicklow Mountains, but, contrary to the advice of his friends, he insisted on visiting Sarah Curran, daughter of the celebrated barrister, and was apprehended. The speech made in his own behalf at the trial on the charge of high treason is remarkable on account of its eloquence, though he was convicted and hanged. Thomas Moore commemorated his fate by writing "O, Breathe Not His Name," while he perpetuated the memory of Miss Curran, who died in Sicily soon after Emmet's execution, by writing "She

is Far from the Land Where Her Young Hero Sleeps."

EMMETT, Daniel Decatur, musician and author, born in Mount Vernon, Ohio, Oct. 29, 1815; died June 29, 1904. He descended from a family which is prominent in the record of American wars, his grandfather having served in the Revolutionary War and his father in that of 1812. He learned to play the violin at an early age, became accomplished on several instruments, and acted with a number of minstrel troops. In 1859 he composed the celebrated song, "Dixie Land," which, during the Civil War, attained a popularity among the Confederates equaled only by "John Brown's Body" among the northern soldiers. This famous air is as popular now as when it was written, and touches the emotions in foreign lands quite as effectually as on the American continent. Other publications include "The Road to Richmond," "Old Dan Tucker," and "Walk Along, John."

EMOTIONS (ē-mō'shŭns). See **Feelings.**

EMPEDOCLES (ĕm-pĕd'ō-klēz), Greek philosopher, born at Agrigentum, Sicily, flourished about 435 B. C. He descended from a distinguished family and is regarded a great poet and public benefactor. According to his theory the world is compounded of four primary elements; that is, air, fire, earth, and water. He thought that there are two forces, hate and love, which he considered repulsive and attractive. His chief work is entitled "Nature," which is a poetic treatment of cosmology and psychology. It is related that he threw himself into the crater of Mount Aetna to immortalize himself, but this is likely a fable.

EMPEROR (ĕm'pēr-ēr), the title of a sovereign who rules over an empire, considered superior to the rank of a king. It originated from the title of *Imperator,* which was conferred by the ancient Romans on the consuls in their military capacity. In later times it designated the highest authority in the state and Julius Caesar assumed this title and made Rome an empire. Charlemagne, who founded the German Empire, received the title of Emperor of the Romans in 800 A. D., and it was borne by his successors until 1806, when the Holy Roman Empire was dissolved. At present it is the official title of the emperors of Germany and Austria-Hungary. The King of England is Emperor of India, and the Czar of Russia is frequently alluded to as an emperor. China, Japan, and Turkey are empires.

EMPIRICISM (ĕm-pĭr'ĭ-sĭz'm), a system of practice based on the results of observation rather than on the scientific investigation of principles. It is evident from the very nature of progress in the learned professions that the early methods employed were more largely empirical than after material advancement had been made, though the value of any system of learning depends to a large extent upon practical observations based upon successful and continuous experiments. In the greater activities of modern civilization scholars aim to take advantage of every useful discovery and method made in previous ages, and, by a system of continuous investigation, to supplement such newer and advancing methods as are evolved in consequence of thorough application. From this it is evident that all methods are to take into account the benefits of systems originated in the past, and to further accumulate and enlarge by experience and observation.

EMPORIA (ĕm-pō'rĭ-ȧ), county seat of Lyon County, Kansas, on the Neosho River, 120 miles southwest of Kansas City. It is on the Missouri, Kansas and Texas and the Atchison, Topeka and Santa Fé railroads. The surrounding country is a fertile farming region. Among the chief buildings are the county courthouse, the Carnegie library, a conservatory of music, and the College of Emporia, a Presbyterian institution. It is the seat of a State normal school. The manufactures include vehicles, ironware, canned goods, flour, dairy products, and works in marble. It has systems of electric railways, waterworks, and gas and electric lighting. Emporia was settled in 1856 and incorporated in 1870. Population, 1910, 9,058.

EMS (ȧms), usually called the Bath of Ems, a bathing place of Germany, about four miles from Coblentz, on the Lahn River, in the province of Hesse-Nassau. The thermal springs belong to the class which contain soda, have a temperature of 78° to 135°, and the waters are used both for drinking and bathing. It has numerous bathing establishments, many of which are finely constructed. The town is noted for its fine hotels, theaters, and private lodging houses. Thousands of visitors throng the place annually. The value of the springs was known to the Romans. Population, 1915, 7,614.

EMU (ē'mŭ), or **Emeu,** a large bird closely allied to the cassowary, standing from five to six feet high. It is native to Australia and the adjacent islands. The color is a dull brown mottled with gray-white, but the young are striped with black. The head is devoid of a helmet, as found in the cassowary, and the bill is depressed. Australian natives value the flesh and eggs for food, the former having a taste which resembles that of beef. Emus are easily domesticated and breed readily in that state. The eggs are not as large as those of the ostrich, being only about four inches in diameter, but require three months for incubation, which is sometimes performed by the male. They live on roots, fruits, and herbage. The only sound uttered is a loud, booming cry made by the female. This species of birds is unable to fly, but it possesses much speed in running. See illustration on following page.

EMULSION (ē-mŭl'shŭn), a medical preparation composed of a soft liquid resembling milk in consistency and color, its oily or resinous property being united with water by a sac-

charine or mucilaginous substance. Among the best known is the emulsion of cod-liver oil, used in treating pulmonary disease.

ENAMEL (ĕn-ăm'ĕl), the name given to vitrified substances of various composition, applied to the surface of metals. It is generally put on like paint, with a brush, and then heated sufficiently to melt the enamel, which causes it to become a fixed part of the surface. The art was practiced by the Egyptians and Etruscans on pottery, and passed from them to the Greeks and Romans. In Western Europe, especially among the Saxons and Normans, it was early employed in manufactures. It is used for producing artistic designs, figures, and



CASSOWARY. EMU.

ornaments, when it belongs to the fine arts, and is employed in making the dial plates of watches and clocks and for coating culinary vessels. The basis of all enamels must be an easily fusible, colorless silicate or glass. All bases on which it is applied must be cleaned with weak acid, or some similar preparation, and moistened with gum water. Copper is the best base, but iron is used for ordinary purposes.

ENAREA (ā-nā'rē-ā), a region of Africa, in the southern part of Abyssinia, between 7° and 9° north. It is inhabited by natives of the Gallas tribes. The government is hereditary and absolute. Among the chief products are coffee, cloth, embroidery, gold, live stock, and fruits. In religion the people are largely Mohammedans. The slave trade is still sanctioned, though it has been abridged greatly in recent years. The government is administered from Saka, a city near the Gibbe River. Population, 1908, 42,500.

ENCAUSTIC PAINTING (ĕn-kąs'tĭk), the method of fixing colors upon objects by the process of burning. The ancient Greeks employed the encaustic art in decorating the inner and outer walls of buildings and in ornamenting sculptures in marble. It was a common kind of painting among the artists of Rome during the empire. The colors were mixed with wax and resin, and the pictures were finished by the application of a hot iron, hence it gave the product a more glossy surface than that obtained in water-color painting. It has the advantage of being very enduring, hence the art has been revived to some extent. Polygnotus's "The Battle of Marathon" is a good example of encaustic painting and was preserved in an open portico at Athens about ten centuries.

ENCYCLOPAEDIA (ĕn-sī-klō-pē'dĭ-ā), **Encyclopedia,** or **Cyclopaedia,** a work in which the various branches of science and art are treated separately, or in particular departments, and usually in alphabetical order. The authors of early encyclopaedias attempted to treat all subjects of human knowledge exhaustively, but, as knowledge extended, vocabularies enlarged, and specialists multiplied, it became necessary to confine the treatise to a smaller limit of subjects or make the work departmental and specialized. It is assumed that Terentius Varro wrote the first extensive work of an encyclopaedic nature in the year 30 B. C. Pliny the Elder soon after prepared his well known "Natural History," which long ranked as a highly superior work. Farabi, an Arabian writer, prepared an encyclopaedia in the Arabian in the 10th century, while Dominican Vincent of Beauvais, under the patronage of Louis IX. of France, collected the whole sum of knowledge of the Middle Ages, to which an anonymous author appended a valuable addition several years later. In 1677 Johann Jacob Hoffman published his great German work, "The Universal Lexicon," at Basel, Switzerland, and in 1697 Pierre Bayle, the French critic, issued his well-known "Dictionary of History." The most extensive of the newer German works are Meyer's "Neues Konversations-Lexikon" and Brockhaus's "Konversations-Lexikon." Ange de Saint-Priest's "Encyclopédie du XIXème siècle" is a modern work in French.

The first English encyclopaedia containing subjects in alphabetical order was the "Lexicon Technicum" published in 1704. Among the newer English works are the "Encyclopaedia Britannica," published at Edinburgh in 1788, Charles Knight's "Penny Encyclopaedia," and "Chambers' Encyclopaedia." The English publications have been revised from time to time and have had a large sale in America. To make them more suitable in Canada and the United States, American supplements or additions have been combined with the English publications. The most extensive encyclopaedia ever published in the world is the Chinese "Encyclopaedia of Literature and Science," containing 5,040 volumes. It embraces information on practically every subject known to the people of the Celestial Empire. Among the leading American publications are "The Americana,"

"Johnson's Universal Cyclopaedia," and "The New International Encyclopaedia." Besides these are smaller editions of general character and numerous works treating on special subjects, such as biography, anatomy, ethnology, zoölogy, etc.

ENDICOTT (ĕn'dĭ-kŏt), **John,** Colonial Governor of Massachusetts, born at Dorchester, England, in 1589; died in Boston, Mass., March 15, 1665. He came to America in 1628, took charge of the plantation at Naumkeag, now Salem, and exercised the chief authority until John Winthrop was appointed Governor, in 1630. He was Deputy Governor of the Massachusetts Bay Colony in 1641-44, and served as Governor from 1644 till 1665, except only several intervening years. Among the early Puritans he ranks as a fearless and energetic leader in public and social life. He established the first mint in the colony, removed the cross of Saint George from the military standard, opposed the practice of wearing long hair, insisted upon women wearing veils at public assemblies, and was instrumental in executing four Quakers. It is related that he was universally respected as a kind and brave man, though he is said to have had a high temper.

ENDICOTT, William Crowninshield, statesman, born in Salem, Mass., Nov. 19, 1827; died May 6, 1900. He descended from the family of Governor John Endicott, graduated at Harvard University in 1847, studied law for three years, and in 1850 was admitted to the bar of Massachusetts. After pursuing a highly successful practice, he secured an appointment, in 1873, to the Massachusetts supreme court, but resigned in 1882 on account of impaired health. President Cleveland selected him as Secretary of War for his first administration, and as such he distinguished himself by efficient service. Joseph Chamberlain, of England, married his daughter.

ENDOGENS (ĕn'dō-jĕns), one of the two primary classes of plants into which the vegetable kingdom is divided, the other being exogens. This designation of character is determined from the structure of the stem, which has the wood in threads mixed with the pith and scattered throughout every part, never forming layers, and from the wood of which the bark cannot be peeled, because of its being partly developed in the interior of the stem. The embryo has but one cotyledon, the leaves are nearly always parallel-veined, and the flowers have their parts in threes or a multiple of three, very rarely in twos or fours, but never in fives. In germination the original radicle issues from a sheath, and, in growing upward, each successive shoot of the stem issues from a former sheath. Palms, bananas, lilies, grasses, and sedges belong to this division.

ENDYMION (ĕn-dĭm'ĭ-ŭn), a mythical youth of Greece whom Zeus had endowed with eternal youth, combining with it the faculty of sleeping as long as he wished and whenever he desired. When Selene saw him asleep on Mount Latmos, his cold heart warmed by the beauty of the youth, and that being came from heaven every night to watch over and protect him. "Endymion," the beautiful poem of Keats, is based on this interesting legend.

ENEMY, in military, the term applied to either of two nations which are at war with each other. The state of enmity begins with a declaration of war, which may be either documentary or by actually taking up arms. Both parties in an armed conflict are called *combatants,* while all others that are interested but exempt from the operations of hostilities are known as *noncombatants.* During a state of war, when two or more nations are enemies to each other, all commercial relations are suspended. In some cases a state may permit its own citizens to trade with the enemy, but as a rule contracts made with an enemy cannot be enforced in the courts of law.

ENERGY (ĕn'ĕr-jў), the capacity to do work. Work is done at the expense of energy. All natural phenomena are caused by energy acting on matter. Whenever it is expended to produce a phenomenon, such energy must be drawn or transferred from some stock of existing energy. For example, when the spring of a watch is run down, and has thus expended the energy it possessed, it requires a new store of energy to be imparted to it. If a book falls from the table to the floor, it requires that energy be imparted to it in order to raise it from the floor to the table. When the book reaches the table, it has acquired energy sufficient to enable it to do work exactly equal to the amount expended on it in raising it that distance. This energy of motion is called *kinetic energy.* So long as the book rests on the table the distance times the weight of the book is stored in the book, and the energy so stored is called *potential energy.*

Experiments in great number have proved that there is never any destruction of energy. It may be transferred from one body to another, or differently distributed among bodies at different times, but the sum total in all the bodies is not lost. Matter and energy never change. In order to effect transmission, when there is no solid or fluid matter to act as a conductor, it must either leap through empty space, or be carried by something in space which we cannot see or otherwise detect. Hence, physicists assume the existence of a medium called *ether.* The energy which resides in ether waves is called *radiant energy.* The form of energy is known by diversified terms, dependent upon the nature of its work. It is designated as light, when it affects the eye; heat, when it raises the temperature; actinic, when it produces chemical changes; and electric, when it gives rise to conditions of electrification.

Since the sum total of energy in the universe,

like the sum total of matter, must constantly remain the same, it gives rise to the general law known as the *conservation of energy*. According to this law no form of energy can be produced except by the expenditure of some other form, nor can it be annihilated except by being reproduced in some other form. The general theory known as the *dissipation of energy* is based upon the tendency of all energy to be converted into heat, and in the form of heat it radiates into space and apparently is lost forever. According to this view, the sun will eventually become a cool and dark body like the earth, since its heat is constantly radiating off and is not returned to it.

ENFIELD (ĕn'fēld), a town of Middlesex County, England, nine miles north of London. It is celebrated on account of the manufacture of rifles and small arms for the government. The noteworthy features include the town hall, the public library, and the remains of a royal palace of Edward III. Enfield has a celebrated school at which Keats studied. It was the home of Charles Lamb. Population, 1911, 56,344.

ENFIELD, a town of Hartford County, Connecticut, on the Connecticut River, about ten miles south of Springfield, Mass. It is on the New York, New Haven and Hartford Railroad. Within the town is a community of Shakers known as Shaker Station. It has a public library and several fine schools. Among the enterprises is the famous Thompsonville carpet factory, in which about 350 looms are employed, having a capacity of 6,000,000 yards annually. It is the seat of the Hazzardville powder mills, one of the largest institutions of the kind in the world. Other factories produce vehicles, plows, sewing machines, timber products, and implements. Population, 1910, 9,719.

ENGEL (ĕng'el), **Ernst,** statistician, born in Dresden, Germany, March 26, 1821; died in 1896. He took a course of instruction at the school of mines in Freiburg, traveled extensively in European countries, and received an appointment, in 1848, as sceretary of the commission for investigating industrial questions. The following year he was made its president. He was connected with the bureau of statistics in 1850-58 and became its director in 1860. Among his works are "Prussia and Its Inhabitants," "The Age of Steam," and "Industrial Statistics of Germany, Europe, and North America."

ENGELMANN, George, botanist, born in Frankfort-on-Main, Germany, Feb. 2, 1809; died in Saint Louis, Mo., Feb. 4, 1884. He studied medicine and the natural sciences at Heidelberg and Berlin. Subsequently he was connected for some time with the University of Berlin, but came to the United States, settling in Saint Louis as a physician. In 1836 he founded a German newspaper, contributed to the "Proceedings of the American Academy," and secured an appointment under the government to prepare botanical reports in relation to North American plants. The most valuable portion of his work relates to the investigation of pines, cacti, and spurges. It is given in reports, including about 100, which have been published as the "Botanical Works of George Engelmann." His library and herbarium were bequeathed to the Missouri Botanical Gardens.

ENGINE (ĕn'jĭn), a machine of complicated parts for utilizing some force in nature to perform work. See **Steam Engine.**

ENGINEERING (ĕn-jĭ-nēr'ĭng), the art of making, building, or using engines and machines, or of designing and constructing public works, requiring special knowledge of materials, machinery, and the laws of mechanics. The range of knowledge required for the different departments is quite diversified, and each of these does not admit of strict definition as now divided. The six principal divisions of this branch of learning consist of military, marine, mechanical, civil, electrical, and mining. *Military engineering* includes the planning, constructing, and maintenance of fortifications and gunnery, artillery, and telegraphy as applied in warfare. *Marine* and *naval* engineering are concerned with works partly of a military and partly of a naval character, such as the planning and construction of vessels of war, engines, and torpedoes. *Mechanical engineering* requires efficiency in the invention, contrivance, and adjustment of machinery. It is necessary that the mechanical engineer be acquainted with the quality and strength of the materials used, the power of steam, and the parts of engines. In addition it is essential that he should understand the construction of various kinds of mills, including those propelled by steam, water, and wind.

The work of a *civil engineer* covers the most diversified field of study and was not developed in England until about the middle of the 18th century. The engineers employed in that country prior to that time were generally secured from Holland. Civil engineers have to do with the construction of railroads, canals, aqueducts, harbors, highways, bridges, and drainage works. *Electrical engineering* as an art sprang into recognition in recent years, owing to the larger and more diversified uses of electricity in machinery and the arts. The work of an electrical engineer has to do with the construction, fitting, and care of electrical machinery and the building of electrical car lines, telephones, and telegraph and oceanic cables. *Mining engineering* is concerned with the construction and operation of copper, iron, coal, and other mines. The general tendency is to specialize more closely from time to time the various departments of engineering.

Many important associations of engineers have been organized and are maintained in the United States. The most important among them are the American Institute of Mining Engineers,

American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Society of Civil Engineers, and Western Society of Engineers. All of these have meetings at specified times to discuss important questions in relation to their interests, prepare published reports, and support libraries and periodicals for the general dissemination of knowledge and skill in their respective fields.

ENGLAND (ĭn'glănd), a country of Great Britain, the most important member of the United Kingdom of Great Britain and Ireland. It occupies all of the southern portion of the island of Great Britain, except the region in the west, which is included in Wales. It is separated from Scotland by the Solway Firth, the Cheviot Hills, and the Tweed River. The outline is in the form of a triangle, with the southern base 315 miles long, and the greatest distance north and south about 360 miles. Its coast line is greatly lengthened by numerous windings and indentations, the most important of which are the Bristol Channel, the estuary of the Severn, Morecambe Bay, Solway Firth, the Wash, the mouth of the Thames, Lyme Bay, and Plymouth Sound. It is separated from Europe by the North Sea, the Strait of Dover, and the English Channel, and Saint George's Channel and the Irish Sea separate Wales and England from Ireland. The area, according to official determinations, is 50,930 square miles.

DESCRIPTION. The surface in the eastern and southern parts is low and gently undulating, and is nicely diversified by slightly rounded elevations and broad, fertile valleys. Ranges of mountains and hills characterize the northern and northwestern part, some of which extend into Wales and form a continuation of the highlands of Scotland. The highest elevations include the Cornish Heights, the Cumbrian Mountains, and the Cheviot Hills; the last mentioned trend from Solway Firth parallel to the boundary line of Scotland. Scafell, one of the highest summits of England, is in the northern part and has an elevation of 3,210 feet. The Cumbrian Mountains, a region famed as the Lake District, is in the northwestern part of England and has peaks that rise about 3,000 feet above the sea. Toward the south, extending through Wales, are the Welch or Cambrian Mountains, and in the high peninsula of Devon and Cornwall are the lower simmits of the Devon Range. As a whole the surface of England is more productive and better adapted to agriculture than any other part of the British Isles.

Numerous small streams drain the surface, the larger number of which flow into the North Sea, hence the general slope is toward the east. Among the rivers which flow into the North Sea are the Thames, Huber, and Tyne, all of which are important for navigation. The Severn, Mersey, and Wye flow into waters tributary to the Atlantic, and are rendered useful for navigation by various improvements and canals. Other streams include the Trent, Wear, Avon, Tees, Dee, and Eden. However, the Severn is the most important in commerce since it has tides of extraordinary height, flows through productive coal fields, and is the longest of the streams. The Mersey has its source in the Pennine Mountains, and flows through a great manufacturing district. All of the streams and the coastal waters are rich in fish, including the cod, herring, mackerel, and haddock. Hull, Grimsby, and Yarmouth are centers of the fishing industry, but London takes rank as the most extensive fish market in the world, having its center at Billingsgate. The annual production of fish is valued at $32,500,000.

MINING. Coal is the most important mineral. It is produced in large quantities in Yorkshire, Lancashire, Derbyshire, and Nottinghamshire. Durham and York are among the centers of the coal mining region. Iron takes second rank in the mineral output and in its production England is exceeded only by the United States and Germany. Yorkshire and Derbyshire produce the greater portion of iron ore and tin is obtained chiefly in Devon and Cornwall. Lead and zinc are mined in Northumberland and small quantities of copper, gypsum, and salt are obtained in different sections. Building stone of all kinds is abundant, including limestone, granite, and sandstone.

AGRICULTURE. The land is owned by a small per cent. of the population. Fully eighty-five per cent. of the surface which is under cultivation is rented in small tracts. Much care is exercised in tilling the soil and maintaining fertility. Estimated upon an acreage basis, more is paid for rent, labor, machinery, and fertilizers than in Canada or the United States. A large number of agricultural laborers have been displaced by the adoption of labor-saving machinery, especially in the sections where cereals are the principal crops. Indian corn is not grown, hence wheat, rye, barley, and oats are the chief cereals. Beans and peas receive much attention and considerable profit is obtained from fruit farming and gardening. Most of the farming is a mixture of crop growing and raising of live stock. England is noted for the Durham, Devon, Hereford, and Sussex breeds of cattle and the Cotswold, Southdown, and Leicestershire sheep. The Berkshire breed of hogs, which are grown extensively, have been naturalized in nearly all countries. Dairy farming receives marked attention. A superior class of horses is raised.

MANUFACTURES. Manufacturing is the principal industry. In the output of manufactures England is exceeded only by the United States. Fully five times as many persons are engaged in this enterprise as upon the farms. This condition is brought about from the natural advantage of having an abundance of coal and iron, and the additional fact that England has

a large merchant marine to encourage foreign trade in the output of the manufacturing establishments. The textile industry is of first importance and the output consists largely of cotton and woolen goods. Manchester is the greatest center of cotton manufacture in the world, while Leeds has the largest woolen mills. Sheffield and Birmingham are centers of the iron and steel industry. Linens are made in large quantities at Leeds and Barnsley and silk manufacturing is carried on in Coventry and Macclesfield. Other manufactures include pottery, earthenware, chemicals, machinery, pins and needles, steel pens, chinaware, cutlery, and firearms. England has some of the largest shipyards in the world.

TRANSPORTATION. A fine system of canals was constructed before railroads were built and these are maintained in a high degree of proficiency. Almost every part of the country can be reached by the navigable waterways, which consist of the coastal waters, estuaries, and streams, and a system of canals that penetrates the trade centers. However, the bulk of the transportation is by railways, which have lines in England and Wales that aggregate 18,500 miles. Many of the canals are controlled by the railways and most of them have trunk lines into London. Much of the local traffic is carried by electric railways, which penetrate from the cities into nearly all sections of the country.

COMMERCE. See **Great Britain.**

CITIES. London, situated on the Thames, is the capital of the United Kingdom and of Great Britain and is the largest city in the world. Fourteen cities, including London, have a population of more than 200,000. These include, in the order of size, Liverpool, Manchester, Birmingham, Leeds, Sheffield, Bristol, Bradford, West Ham, Kingston-upon-Hull, Nottingham, Salford, Newcastle-upon-Tyne, and Leicester. Eighteen other cities have a population of more than 100,000, including Portsmouth, Bolton, Sunderland, Oldham, Croydon, Blackburn, Brighton, Willesden, Rhondda, Preston, Norwich, Birkenhead, Gateshead, Plymouth, Derby, Halifax, Southampton, and Tottenham. About seventy-eight per cent. of the people of England and Wales live in towns and cities.

EDUCATION AND INHABITANTS. England is divided into forty counties, each of which has the right of local self-government similar to that of the counties in Canada and the United States. Educational facilities are provided under a system of local taxation and grants by the state. A nominal compulsory school attendance law is well enforced. Much of the instruction is in private and denominational schools. A board of education has control of elementary education under a law which went into effect in 1900, by which the efficiency of instruction has been greatly increased. Oxford and Cambridge were the only great centers of higher learning at the beginning of the 19th century, but within that century four others were organized. These include Victoria University and the universities of London, Durham, and Birmingham. The inhabitants number about 610 to the square mile. Emigration and immigration have been about equal the last decade. Immigration is chiefly from other parts of Great Britain, Russia, Germany, and Belgium. Population, including Wales, 36,075,269. See **Great Britain.**

GOVERNMENT. See **Great Britain.**

LANGUAGE. The English language spoken in modern times is entirely Germanic in its general character and grammatical construction, though it resembles more nearly the Low German than the higher class in general use. There are three periods in its history, including the Old English, Middle English, and Modern English. The first of these extends from the German Conquest of England in about 450 to the Norman Conquest in 1066; the second to about 1400; and the last embraces all the period from the latter date. Old English or Anglo-Saxon included several dialects, all of which were highly inflected. Two languages were spoken from the Norman Conquest until about the middle of the 13th century, but these became greatly mixed, and, after a time, the French merged with the Anglo-Saxon, forming the Middle English, the language of Chaucer, Langland, and Wycliffe. Modern English differs so materially from the older forms that few words of the latter resemble the English of the present time. Discoveries, inventions, diversifications of industries, and advancement in science and sublety of thought have all modified and enlarged the language, and, for that matter, all others. It is estimated that the English language is spoken by about 115,000,000 people, though it is understood by fully 120,000,000.

LITERATURE. English literature is naturally divided into three periods—from its beginning to the Norman Conquest in 1066, from the Norman Conquest to the Reformation under Henry VIII. in 1527-47, and from the Reformation to the present time. The literature of the period antecedent to the conquest may be divided into Celtic, Latin, and Anglo-Saxon, and is of a form that cannot be read except by students making its study a specialty. The most eminent Celtic writers include Llywarch Hen and Merlin or Merddhin, and the Latin writers embrace Ethelwerd and Bede. The Norman period extends from the Conquest in 1066 to the commencement of English literature in 1255. Prior to the Conquest a form of Anglo-Saxon literature had developed. It was represented chiefly in the *Anglo-Saxon Chronicle*, which continued to be published until 1154, when the native language went practically out of use. At that time Latin was generally used in history, law, and philosophy, while French was employed in poetry and the literature for general reading.

After the loss of Normandy, in 1204, the English-speaking people gradually attained to a majority, and we find English employed by Roger Bacon, Geoffrey of Monmouth, and Geoffrey Chaucer. The last mentioned is regarded the first great poet of England, and, though a student of French romance and chivalry, he wrote verse in the English. He translated "The Romance of the Rose" into English, and in later years made a study of Italian literature, thus giving the English the benefits of translations from Dante, Boccaccio, and Petrarch. Among the most famous writings of Chaucer are "The Assembly of Fowls," "The House of Fame," and "Canterbury Tales." Though city-bred, Chaucer was a lover of the fields and flowers and showed a marked sensitiveness to the charm and beauty of the world. His "Canterbury Tales" is the most noted of his works. It is written in a poetic form and relates the plan of a company of thirty who journeyed from London to Canterbury, where they designed to visit the shrine of Saint Thomas à Becket. The poem relates the different stories told by each member of the company. Among the contemporary writers of Chaucer are the poets, John Gower (1325-1408), Robert Langland (1332-1406), and the prose writer, John Wycliffe (1324-1384). The writings of this period took on the form of the English as written at the present time.

The writers of England between the time of Chaucer and the end of the 16th century were largely imitators of that poet, including James I. of Scotland, John Skelton (1460-1529), and Sir Thomas More (1478-1535). It may be said that this period was generally barren, but with the invention of printing an appetite for literature began to awaken. This was due largely to the fact that the crusades came in contact with Greek scholarship in Constantinople and Southern Europe, where a taste for Greek and Roman literature was still alive. When the Turks drove the Greek scholars from Constantinople in 1453, they spread rapidly toward the west and found many young persons eager to learn the classics and philosophy of Greek and Roman masters. There was not only a tendency to journey to Italy for the purpose of studying, but scholars were induced to come to Western Europe and gradually found their way to England. It was the height of ambition to be able to read Homer and Plato, and to discourse on the writings of Demosthenes and Cicero.

The discovery of America induced a greater interest in geography, opened new avenues of commerce and social activity, and rapidly prepared for a transition from the Middle Ages to the dawn of learning. While Erasmus, the Dutch scholar and philosopher, was teaching Greek at Oxford, he aroused an interest in the New Testament, and published "The Christian Soldiers' Dagger." William Tyndale translated the New Testament into English, which he published in Germany in 1525, and circulated it extensively in England. In the meantime the Reformation in England came on in the reign of Henry VIII., who separated England from Rome, thus paving the way for the enthusiasm always attending a great epoch prominently affecting a large number of people. Sir Thomas More, the author of "Utopia," was beheaded, and many other writers suffered a similar fate.

Among the prominent literary men immediately after the Reformation are Sir Thomas Wyatt, the first artistic poet, and Henry Howard Surrey, a writer of sonnets and blank verse. These and other writers gave an impetus to literature by making songs and sonnets national, and prepared the way for the Elizabethan age of literature. This age is famous because of the large number of men who came forward with writings of merit, such as Edmund Spenser, William Shakespeare, Ben Jonson, Roger Ascham, Francis Bacon, and Lyle the Euphuist. Other writers of this period include Peele, Marlowe, Greene, Herbert of Cherbury, Middleton, Marston, Raleigh, and North. The writings of Shakespeare, which appeared between 1585 and 1616, are the most prominent of the period and in many respects are the finest in English literature. They possess a wealth of imagination rarely equaled, and embody passages of the gravest wisdom, the purest motives, and the tenderest feeling.

Ben Jonson holds a high rank as a song writer and produced a number of excellent comedies and other plays. Philip Massinger (1583-1640) ranks among the dramatists of this period; Abraham Cowley (1618-1667), among the lyric poets; Thomas Hobbes (1588-1679), among the historians; and John Milton, among the poetical and prose writers. Milton's "Paradise Lost" is a masterpiece of English literature. Other writings of Milton include "Paradise Regained," "Il Penseroso," "Hymn on the Nativity," and "L'Allegro." Other religious writers of the same period include James Usher (1581-1656), Jeremy Taylor (1613-1667), John Biddle (1615-1662), and Richard Baxter (1615-1691). John Bunyan, author of "Pilgrim's Progress," marks an epoch in English literature. Few works have been so widely translated and so extensively read as his masterpiece, the "Pilgrim's Progress."

John Dryden wrote many popular plays after the Restoration. He is the author of "Hind and Panther," a religious discussion, and "Absalom and Achitophel," a famous satire. The death of Dryden in 1700 marks the beginning of the Augustian age in English literature and its greatest poet is Alexander Pope. This age witnessed the advent of many scientific and philosophical writers, among them Sir Isaac Newton, John Ray, John Locke, Richard Steele, Joseph Addison, Jonathan Swift, James Thompson, and Thomas Gray. James Thomp-

son is best remembered by his "Seasons," Thomas Gray by his "Elegy Written in a Country Churchyard," and Daniel De Foe by his "Robinson Crusoe." Samuel Richardson published "Pamela," one of the first modern novels, and Henry Fielding is favorably known by his "Joseph Andrews," "Tom Jones," and other novels.

Samuel Johnson stands as the literary representative of the second half of the 18th century. His most famous works include "Lives of the Poets" and "Vanity of Human Wishes." The name of Oliver Goldsmith is inseparably connected with that of Johnson. He is the writer of "Vicar of Wakefield," "The Deserted Village," and the comedy "She Stoops to Conquer." William Cowper is an eminent poet of the latter part of the 17th century and is noted for his introduction of profound religious sentiment. Richard B. Sheridan is the author of "School for Scandal" and a number of other popular writings. David Hume, Adam Smith, Edmund Burke, and Edward Gibbon are among the most eminent historians and political writers of the latter part of the 18th century.

The 19th century is the greatest in the history of English literature, both in the character of the productions and in the number of writers. The early writers of this period include Samuel T. Coleridge, whose "Ancient Mariner" represents the finest type of ballads; William Wordsworth, author of "Recollections of Early Childhood," and Sir Walter Scott, writer of "Ivanhoe," "Rob Roy," "Kenilworth," "Lay of the Last Minstrel," and "Lady of the Lake." Other poets of the 19th century include Lord Byron, Percy Shelley, John Keats, George Crabbe, Leigh Hunt, Thomas Moore, Alexander Smith, Elizabeth Browning, Robert Browning, Lord Lytton, Robert Buchanan, Alfred Tennyson, William Morris, Matthew Arnold, and Charles Mackay. The novelists embrace Jane Austen, Lord Lytton, Benjamin Disraeli, Charles Dickens, Charlotte Brontë, Charles Reade, Charles Kingsley, George Eliot, William Thackeray, George Meredith, R. D. Blackmore, George MacDonald, and Thomas Hardy. Among the philosophical writers are John Stuart Mill, Alexander Bane, Sir W. Hamilton, Charles Darwin, Herbert Spencer, Max Müller, Thomas H. Huxley, John Tyndall, and T. H. Greene. The historical and biographical writers include Thomas B. Macaulay, Thomas Carlyle, John R. Green, Lesley Stephen, John Morley, Cornwall Lewis, James A. Froude, Alexander W. Kinglake, William E. Lecky, and Dean Stanley. Among the prominent theological writers are Isaac Taylor, Julius Hare, Stopford Brooke, Henry P. Liddon, Augustus Hare, John H. Newman, Richard Whately, and John Maurice. Other writers of note include John Ruskin, Harriet Martineau, W. E. Gladstone, Sir Arthur Helps, Matthew Arnold, Thomas De Quincey, George Grote, Michael Faraday, Edward A. Freeman, and Thomas Henry Hall Caine.

The beginning of the 20th century marks a period of great activity in the field of literature. In 1907, which is a representative year, there were issued a total of 7,701 new books in England, besides 2,213 new editions of books formerly published. The greatest number were in the line of fiction, a total of 1,862 new books and 920 new editions of old books. Those coming next in numerical order are books on the arts and sciences, theology, history, politics, education, and poetry. The period is noticeable for its greater exchange of books with Canada and the United States, especially in the lines of fiction, theology, and politics. Among the more widely read recent authors may be named Winston Churchill, H. Rider Haggard, Alfred Austin, Frances Hodgson Burnett, Edith Wharton, Rudyard Kipling, James Bryce, George Otto Trevelyan, Arthur James Balfour, Andrew Lang, and John Morley.

HISTORY. England was invaded by the military forces of Caesar in 55 B. C. and later became a Roman possession. Its history proper begins with the withdrawal of the Roman forces in the early part of the 5th century A. D., when the Germanic people invaded portions of what was known as Albion or Britain. These Germanic people first moved west from Germany into the lands now called Denmark and Schleswig. Later many removed to England, being attracted by opportunities of development and numerous settlements that had previously been made by the Gauls, Germans, Iberians, Dacians, Italians, Phrygians, and others that located in the country during the time of the Roman occupation. Those conquering the country were made up largely of Jutes, Angles, and Saxons, the term Anglo-Saxon originating from the latter two, and the country itself deriving its name from the Angles or Inglisc.

The German ideas and forms of local government began to be introduced about the middle of the 5th century, and from them the language and civil institutions largely originated. From this mixture of races, which was influenced, no doubt, by non-Aryan races that preceded them, among them the Euskarians and Celts, sprang the English, a self-reliant, industrious, ambitious, and daring people, who built up a language and institutions which have in a large measure influenced the trend of modern arts and civilization.

The early history and events that led to the final building of an independent kingdom were complicated by many civil and religious struggles, which extended themselves over a period including many centuries. The Jutes formed settlements in the Isle of Wight, Kent, and adjacent regions, while the Saxons occupied tracts in the south, and the Angles in the north. The struggle for supremacy which resulted from conflicting claims cover a period

of 150 years. It finally terminated to the advantage of the Teutonic tribes, who ultimately occupied the entire southern portion of Britain, except only Wales, West Wales, and Strathclyde. The territorial divisions were small, though seven of the most important formed an alliance of friendship known in history as the *Heptarchy*. This protracted struggle in the course of time resulted in annexing the smaller divisions to the more powerful neighbors. Egbert succeeded in securing sovereignty over the seven kingdoms in 827, and made himself ruler of a large part of the country, to which the name England was first applied. Prior to the Teutonic conquest Britain was largely isolated from continental Europe, but soon after the learning and culture of older civilization was introduced, a closer intimacy was established, and a written literature began to form. Though the conquerors were strangers to Christianity, they were converted district by district after a severe contest, which reached its height in the 7th century. Soon after the Danes began to make incursions. About fifty years after the formation of the United Kingdom they became masters of the whole of England, though their reign was only momentary.

Alfred the Great ascended the throne in 871 and succeeded in defeating the Danes at Ethandune in 878. The nine succeeding monarchs were more or less in conflict with Danish incursions, the latter of whom, Edmund II., was compelled to surrender a portion of his kingdom to Canute, and, when the former was assassinated in 1017, the sovereignty of the entire country fell into the hands of the Danes. The name *Great* was attached to Canute on account of his personal qualities and the extent of his possessions, which included, besides England, Denmark and Norway. He was followed by two Danish kings who managed the government with moderation, though their reign was disturbed by Norman incursions and Saxon revolts. Two Saxon kings followed the Danish, but in 1066 the country was conquered by William of Normandy. This military achievement, known in history as the *Norman Conquest*, caused the country to be governed by Norman kings 69 years. After the death of Henry I., Stephen, son of the Count of Blois, raised an army in Normandy with which he proceeded to England and claimed the kingdom. Civil war was carried on for a series of years, but finally terminated in a peace, in which Stephen was recognized as sovereign for life, but Henry, son of Matilda, daughter of Henry I., was to succeed him on the throne. As Stephen died in 1154, Henry II. became his successor, and the Plantagenet line of succession ruled England for 245 years.

During the reign of the Plantagenet line the country was more or less disturbed by conflicting claims of the people against the feudal system of land ownership established after the Norman Conquest. Wars with Wales and Scotland likewise tended to distress the government, but they operated to unite the people of England as against foreign invasion, although they were divided by the conflicting pretensions of the Lancasters and Yorkites. The claims of the people to their ancient rights and liberties were recognized in the *Magna Charta*, called the Great Charter, on June 15, 1215, and, under the leadership of Simon de Montfort, Henry III. was seized and required to pledge the organization of Parliament, which gave the people the right of representation and led to the permanent establishment of the House of Commons. Richard II. was compelled to surrender to 60,000 malcontents. He was succeeded in 1399 by Henry IV., the first representative of the house of Lancaster, which governed England for 62 years. The prosecution of the Lollards took place in the reign of Henry IV. He was succeeded by Henry V., in 1413, who gained marked successes over the French and was to succeed to the throne of France. However, the advantages he gained were lost by his son, Henry VI., largely through the achievements of Joan of Arc. His reign was succeeded by the York dynasty after a long line of struggles for supremacy.

Henry Tudor gained the Battle of Bosworth in 1485, in which Richard III. was slain, and the throne was ascended by Henry VII. During the reign of his successor, Henry VIII., England was disturbed by the Reformation. Events formed quickly by which Elizabeth ascended the throne and became the nominal head of the Protestant faith. Her reign was characterized by remarkable rivalry in architecture, literature, and commercial competition for colonization in opposition to Spain. She was succeeded by James VI. of Scotland, son of Mary, Queen of Scots, who assumed the title of James I. of England. This placed the Stuarts upon the throne after a long contention, but their sovereignty was weakened by constant disputes with the Parliament and the rise of the republican forces, stimulated largely by Oliver Cromwell. The people finally wrung from the king the right of petition, by which the power to levy taxes became vested in the House of Commons, and the king was abridged in his authority to govern in many matters of vast interest. Cromwell succeeded in establishing the Commonwealth in 1649, with himself as Lord Protector, though it survived him but a short time, terminating abruptly under the feeble protectorate of his son, Richard, and Charles II. was called to the throne by the Restoration of 1660.

The old dissensions between the king and Parliament soon broke out anew and William of Orange, supported by the Whig party, drove James II., successor of Charles II., from the country and became the first parliamentary king. When Queen Anne ascended the throne, she found the grand alliance with Holland and

Germany of much value. Her government was further strengthened by the success of her army at Blenheim in 1704 and at Ramilies in 1706, under Marlborough. The history of England became merged into that of Great Britain in 1807, by virtue of the act of union passed in that year uniting England and Scotland. In 1714 the Hanover dynasty succeeded to the throne and the last attempt of the Stuarts was thwarted in 1715. For more recent history, see **Great Britain, War.**

Below is a list of English sovereigns:

Dynasty and Title.	Began.	Years.
Anglo-Saxon Line.		
Alfred, King of Wessex	871	30
Edward I., King of Wessex	901	24
Athelstan, King of England	925	15
Edmund I.	940	6
Edred	946	9
Edwy	955	4
Edgar	959	16
Edward II.	975	3
Ethelred	978	38
Edmund II.	1016	1
Danish Line.		
Canute	1017	19
Harold I.	1036	3
Hardicanute	1039	2
Saxon Line.		
Edward III.	1041	25
Harold II.	1066	..
Norman Line.		
William I.	1066	21
William II.	1087	13
Henry I.	1100	35
House of Blois.		
Stephen	1135	19
Plantagenet Line.		
Henry II.	1154	35
Richard I.	1189	10
John	1199	17
Henry III.	1216	56
Edward I.	1272	35
Edward II.	1307	20
Edward III.	1327	50
Richard II.	1377	22
House of Lancaster.		
Henry IV.	1399	14
Henry V.	1413	9
Henry VI.	1422	39
House of York.		
Edward IV.	1461	22
Edward V.	1483	..
Richard III.	1483	2
House of Tudor.		
Henry VII.	1485	24
Henry VIII.	1509	38
Edward VI.	1547	6
Mary	1553	5
Elizabeth	1558	45
Stuart Line.		
James I.	1603	22
Charles I.	1625	24
Commonwealth.		
Oliver Cromwell	1649	10
Richard Cromwell	1658	..
Stuart Line.		
Charles II.	1660	25
James II.	1685	3
House of Orange.		
William and Mary	1688	14
Stuart Line.		
Anne	1702	12
Hanover Line.		
George I.	1714	13
George II.	1727	33
George III.	1760	60
George IV.	1820	10
William IV.	1830	7
Victoria	1837	63
Edward VII.	1901	9
George V.	1910	....

ENGLAND, Church of, the dominant religious body of England and the established church of that country. It claims to be a true and apostolical church, teaching and maintaining the doctrines of the apostles. The law recognizes it as the national church and protects it in the endowments; that is, the gifts of land and tithes made to it in ancient times. As at present organized, it dates from the time of Henry VIII., who abolished papal authority in England and established the independence of the Church of England. He became the supreme head of the church, dissolved the monasteries, and convoked an assemblage of clergymen to pass upon ten articles of faith drawn up at his suggestion. This convocation declared against the invocation of saints, the worship of images, and the belief in purgatory, and expressed the view that the whole Christian faith is to be found in the Bible. This was soon followed by the publication of the Bible in English, which greatly tended to spread the reformed doctrine, and prayers and services began to be in English. During the short reign of Edward VI., son of Henry VIII., the reforming element had complete sway, and came to look with favor upon the teachings of Luther and Calvin, but a strong reaction occurred when Mary, who was a Catholic, ascended the throne. She exerted an unrelenting influence to reëstablish Catholicism, and many of the reformed clergy escaped to the continent, while those remaining in England were persecuted as heretics or compelled to retract.

Queen Elizabeth ascended the throne in 1558 and favored the Reformation, but contentions now arose with the Puritans, who had gained many adherents during the reign of Queen Mary. The Thirty-Nine Articles, originally 42 in number, but now 39, had been drawn up in 1551 under Cranmer and Ridley, and these were reviewed and revised. A convocation of the clergy accepted the amended articles and they were ratified by the queen, and Parliament legalized them in 1563 and later made it compulsory for the whole clergy to subscribe to them. Together with the homilies and prayer books, they constitute a complete exposition of the tenets held at present by the Church of England on all the main points of doctrine and discipline. The church has possession of the ancient religious edifices and the cemeteries attached to them. It is protected by law in the exercise of its right and its teaching is accepted by the state. It is one of the states of the realms and has an integral part in all legislation.

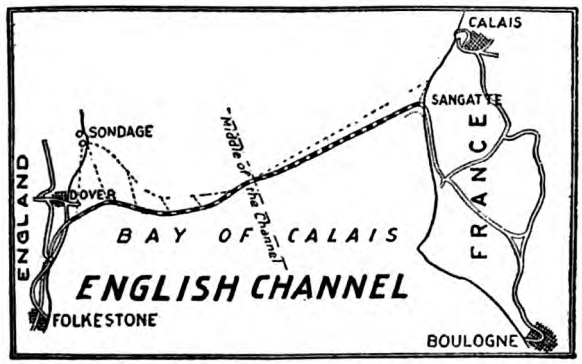
The government of the Church of England is under a system of jurisprudence made up of three elements; namely, the common law, the canon law, and the statute law. The first consists of customs and precedents; the second, of canons passed or accepted by the English synods; and the third, of acts of Parliament relating to the church. Two archbishops, those

of Canterbury and York, preside over the two provinces into which the country is divided, but the Archbishop of Canterbury is the primate of all England. The provinces are divided into dioceses, which are presided over by bishops, and those subject to them include the archdeacons, deans, canons, prebendaries, rectors, vicars, and curates. Missionary work is carried on in all parts of the civilized world. The Episcopal Church (q. v.) is a branch of the Church of England.

ENGLEWOOD (ĕn'g'l-wo͝od), a city of New Jersey, in Bergen County, fourteen miles north of New York City. It is situated near the Palisades of the Hudson River, on the Erie Railroad, at the edge of the Hackensack Valley. The chief buildings include the public library, a hospital, and the high school. Many New York business men reside in Englewood. It was incorporated as a village in 1860 and chartered as a city in 1896. Population, 1905, 7,922; in 1910, 9,924.

ENGLISH (ĭn'glĭsh), **William Hayden,** public man, born in Lexington, Ind., Aug. 27, 1822; died Feb. 7, 1896. He graduated from Hanover College, Indiana, and built up a successful law practice. In 1843 he was clerk in the lower house of the Indiana Legislature, and served as a Democrat in the United States House of Representatives in 1853-61. He was nominated for Vice President with Winfield S. Hancock in 1880, but was defeated in the election. In 1853-61 he was a regent of the Smithsonian Institution. He published "Life of George Rogers."

ENGLISH CHANNEL, an important body of water which connects the Atlantic Ocean



ROUTE OF PROPOSED TUNNEL FROM ENGLAND TO FRANCE.

with the North Sea and separates France from England. On its eastern end it is connected with the Strait of Dover, where it is twenty-one miles wide, and at the western end it has a width of about one hundred miles. A strong current running eastward passes through the channel, influenced largely by the Gulf Stream, and its waters are often disturbed by storms. The Isle of Wight and the Channel Islands are within the channel. Among the English ports are Brighton, Dover, Falmouth, Plymouth, and Southampton. The French ports include Boulogne, Calais, Cherbourg, Dieppe, and Havre. A plan to construct a railway tunnel from Dover, England, to Calais, France, was proposed as early as 1875. Several bills were before Parliament in 1908 and since, but no material progress has been made, aside from surveying the route from Dover to Sangatte. The estimated cost of the tunnel is $80,000,000.

ENGLISH LANGUAGE. See **England.**

ENGLISH LITERATURE. See **England.**

ENGRAVING (ĕn-grāv'ing), the art of cutting marks or figures on wood, stone, or metal. Engraving is very ancient, being mentioned in Exodus xxviii, 36. The oldest records were cut in stone, some by making depressions and others by cutting the stone away and leaving the characters in relief. In Egypt the hieroglyphics were cut in the granite monoliths and on the walls of tombs and chambers. Later the Greeks learned the art from the Egyptians and Phoenicians. The discovery of the practicability of taking impressions upon paper from an engraving was made by a Florentine artist named Maso Finiguerra, about 1440. In taking a cast in sulphur of some engraved church ornaments, a quantity of dust and charcoal, which had gathered in the lines of the engraving, came out upon the sulphur and gave an unexpected and suggestive effect.

Many kinds of engravings are employed in the arts, depending upon the purposes they are to serve. They include *line engravings* on metal plates, usually copper or steel; *etchings* on metal in which the lines are corroded by means of acid; *mezzotints,* in which there are no lines, but only shades produced by roughening the surface of the metal; and *woodcuts.* Wood engravings intended for printing long preceded those made of metal.

The process of printing from engravings was common in China in the 10th century, but it remained a secret with them for many years. The Italians and Germans attained considerable skill in engraving as early as the 13th century, but the earliest known niello proof on paper was made in 1452. Within the three succeeding centuries the art became extremely productive under such artists as Albert Dürer (1471-1528) and Peter P. Rubens (1577-1640), and developed until imitations of all varieties of engravings were made in woodcuts, but the practiced eye sees at a glance that the result is nothing but a woodcut. Through lack of encouragement, change of fashion, and the adoption of other cheaper methods of production the woodcut and line engravings are going rapidly out of use. Besides, there are not sufficient induce-

ments for young men to pursue study in this particular process of engraving, for the reason that the newer and more rapid methods are supplanting it.

Copper is used extensively in making plates for certain kinds of engravings, especially those in which a soft metal is serviceable. The invention of steel engraving in the United States has brought that metal into use for the finer pictures, owing to its greater hardness, which enables it to overcome the wear of printing and makes it possible to take a larger number of impressions than can be gotten from a copper-plate. Etchings are made by covering a prepared metallic surface with a thin coat or ground, which is not affected by acid. The design is traced with a pointed tool, which lays the metal bare wherever it touches. A wall of wax is raised around the design to hold the diluted acid, when poured on. For a copper-plate this consists of five parts water and one part nitrous acid; for steel, pyroligneous acid one part, nitric acid one part, water six parts. The acid corrodes on the lines made through the ground. This is called biting in. When a sufficient depth is attained for lighter tints of the etching, the acid is removed and the surface is washed and allowed to dry. The parts of sufficient depth are now varnished and, when dry, another biting in deepens the lines not varnished, and, when deep enough for the second tint, it is removed again. This may be repeated several times, if necessary. The process of deepening the lines in this way is called *rebitting.* Etchings are sometimes finished by a graver and partake of the character of a line engraving. Glass may be engraved in a similar manner. Soft-ground engraving is another of the many ways of drawing the design. In mezzotint engraving the entire surface of the plate is roughened slightly, after which the drawing is traced, and then the portions intended to show high lights or middle lights are scraped or burnished, and the shadows are strengthened. Engravings so produced resemble photographs.

It is to be noted that the photomechanical processes of engraving have been improved materially since 1880. These include the *half-tone process* invented by Frederic E. Ives, an American, in 1881; the *line-relief process;* the *intaglio-engraving process;* and the *wax process.* The half-tone is used largely in the better class of magazines; the line-relief process, for cheap newspaper illustrations; the chalk-plate, for small newspaper cuts and generally by the government in making weather maps; and the wax process, for making railroad, geographical, state, county, and town maps.

ENID (ē'nĭd), county seat of Garfield County, Oklahoma, about 35 miles north of Kingfisher. It is on the Saint Louis and San Francisco, the Chicago, Rock Island and Pacific, and other railroads, and is surrounded by a fertile farming region. The chief buildings include the high school, the county courthouse, and several churches. It is important as a shipping center for grain and live stock. The manufactures include flour, brick, ice, clothing, confectionery, and machinery. It has grown very rapidly since 1893, when the Cherokee strip was opened for settlement. Population, 1900, 3,444; in 1910, 13,799.

ENNIUS (ĕn'nĭ-ŭs), **Quintus,** Roman poet, born at Rudiae, Italy, in 239 B. C.; died in 169 B. C. He is considered the father of Latin poetry and claimed descent from a mythical hero. Little is known of his early life. He appears to have been a soldier in the Roman army, enjoying the friendship of Cato the Elder, who invited him to Rome, where he gained the friendship of Scipio Africanus the Elder. He is the author of tragedies, comedies, and a number of poems, but only fragments of his writings are now extant. His poem on Roman history, entitled "Annales," is the chief foundation of his fame.

ENOCH (ē'nok), the son of Jared and father of Methusaleh, called "the seventh from Adam" to distinguish him from Enoch, the son of Cain, who was the third from Adam. In the Scripture it is stated that "he walked with God" and "pleased him," and it is thought that he was transported to Heaven, since we are told that "he was not, for God took him." Mention is made of him in Heb. xi., 5 and in Jude xiv., 15. The Book of Enoch is a prophetical work mentioned in many writings of the fathers. It is apochryphal and contains 108 chapters. Jude xiv. and xv. quotes from it. It is not certain when or by whom it was written, but it is generally assigned to the time of the Christian Era and was probably written in the Hebrew.

ENSILAGE (ĕn'sĭ-lăj), in agriculture, a process of preserving green forage crops for stock food. Dairy farmers have a method of storing green fodder in mass and covering it over in deep trenches cut in a dry soil, by which the natural condition is readily preserved, though the ordinary way of handling ensilage is by cutting the crop, usually corn, and placing it in an air-tight mow or silo for curing. The crop product is stored as near as practicable to the place of feeding in order to insure the greatest possible convenience. In corn culture for ensilage farmers aim to produce the largest possible quantity of both corn and forage. The crop is cut a brief period before being ripe enough for ordinary cutting. It is then taken to the mow and, after being cut in proper lengths, is carefully stored by placing successive layers and tramping them as firmly as possible. The ensilage may be stored to a height of 20 or 30 feet, and, after settling several days, the upper portion may be refilled. Another method which has been introduced recently is to cut the fodder by a machine, which at the same time elevates the finely cut product into

the top of the silo by a current of air. The silo should be air tight and so constructed that it can be emptied from the side. This class of forage crops is a very nutritious and wholesome food for cattle, sheep, and horses. Successive experiments have proved that more food can be secured per acre by the culture of crops and their preservation as ensilage than in any other way.

ENTOMOLOGY (ĕn-tŏ-mŏl′ŏ-jў), the science which treats of insects. Aristotle called attention to one of the essential characteristics by pointing out that the bodies of insects are cut or divided into segments, from which their name was derived. See **Insects.**

ENTOZOA (ĕn-tŏ-zō′ȧ), the name given by Karl Asmund Rudolphi (1771-1832), a Swedish naturalist, to a class of animals living within the bodies of other animals. They are found in the intestines, liver, brain, muscles, and other tissues. According to a group of writers the entozoa are divided into three classes: coelelmintha, or hollow worms; sterelmintha, or solid worms, as the tapeworms; and accidental parasites. Some writers treat them as equally mature and immature; the latter, inclosed in cysts, being far the most dangerous when found in inclosed cavities, as the lung or liver. See **Parasites.**

ENVELOPES (ĕn vĕl-ōps), in botany, the whorls of alternated leaves designed to protect the organs of fructification from injury. In very rare cases there are none, sometimes one, though generally two—the calyx and the corolla. The name also applies to paper coverings for letters or notes that came into extensive use with the growth of the postal system. They are now shaped, folded, and gummed by machinery. A single machine of the larger type has a capacity to turn out 50,000 envelopes per day.

ENVIRONMENT (ĕn-vī′rŭn-mẹnt), a term used to indicate the sum of external conditions that limit or direct the activities of an individual. It is frequently used in distinction of the term heredity, which is the tendency possessed by an individual to resemble the ancestral stock in general characteristics, while environment includes everything which is not identified with the individual self. The subject divides itself into two kinds, the physical and the social. The former includes all the outside influences with which one may come in contact, such as climate, food conditions, the physical features of a country, the absence or presence of enemies, etc. Social environments embrace principally the customs, habits, industries, religion, institutions, etc. Physical environments exercise a marked influence upon both animal and plant life, and social environments refer more particularly to the animal kingdom.

The word *environment,* in the field of education, expresses best the things which make for character by their silent influence. These mold lives from day to day by their silent impressions upon the individual. Children reared in clean and tidy homes, under the influence of moral and humane teaching, obtain a bent of desires and thoughts toward the orderly and noble. The home and the school share, perhaps, equally the responsibility of early impressions, hence the need of providing such environments as will tend toward and uplift the moral and physical life of the young. Such influences, together with the part exercised through outside factors, are potent in determining the character of an individual as well as of the community in which he lives. It may be said that under primitive conditions of civilization social environments exercise a minor influence, but with the advancement of society and the enlargement of communities comes the need of exercising great care in selecting or shaping the environments with which the young may come in contact.

EOCENE (ē′ŏ-sēn), in geology, the first great division of the Tertiary period. It was the dawn of the present order of shells and mollusks, a few birds, reptiles, and all the invertebrate animals still living. Among the plants both endogens and dicotyledons were numerous. Man had not appeared upon the earth. The Eocene strata consist of marl, limestones, clays, and sandstones. In most cases the strata were deposited in salt or brackish waters.

EOZOIC (ē-ŏ-zō′ĭk), the name given to rocks of the Laurentian age, in which, so far as at present known, the earliest traces of life are found.

EPACT (ē′păkt), a number introduced into the Gregorian calendar, employed to express in days the age of the moon on Jan. 1, and thus to determine its age on March 21. The Council of Nice appointed Easter Sunday to be the first Sunday after the first full moon following the vernal equinox, and this Sunday is now found by a formula. When the epact is known, it is possible to calculate the dates of all the following lunar phases throughout the year. To find the epact it is necessary to know the golden number, which is ascertained by adding 1 to the date of the year and dividing the sum by 19. The remainder is the golden number, except when the remainder is 0, when the golden number is 19. Having found the golden number, the epact of any year between 1900 and 2199 may be found by the following table. Suppose the golden number to be 15, it will be seen that the epact is 3:

Golden Number	Epact	Golden Number	Epact
1	29	11	19
2	10	12	30
3	21	13	11
4	2	14	22
5	13	15	3
6	24	16	14
7	5	17	25
8	16	18	6
9	27	19	17
10	8		

EPAMINONDAS (ĕ-păm-ĭ-nŏn'dȧs), noted Greek hero, born about 418 B. C.; slain in 362 B. C. He came from an ancient family and lived in retirement until he was forty years of age, but was finally inspired with enthusiasm by Lysis, a follower of Pythagoras. In 385 he saved the life of Pelopidas in battle, a man of much virtue. Later he enlisted in the ranks of the patriots and raised Thebes to the summit of power and prosperity. When sent to Sparta in 371, he displayed much firmness in negotiating terms of peace, though the treaty was not ratified and war was resumed. He was placed at the head of the Thebans and four times successfully invaded the Peloponnesus, and, when success had followed his last effort, he was mortally wounded by a javelin. The ancients extolled the justice and moral purity of Epaminondas as much as his military talent, and it is said of him that he never deviated from the truth, observing strict veracity even when jesting.

EPHESUS (ĕf'ĕ-sŭs), an ancient city of Asia Minor, situated in Lydia, near the mouth of the Cayster River. It was classed with the twelve Ionian cities founded by the Greeks, and was regarded sacred from an early period, though its importance dates from a time quite more recent than the Trojan War. The first of its great temples was founded about 650 B. C., completed after 120 years, and destroyed in 356 by Herostratus. It passed successively under the possession of the Lydians, Persians, Greeks, and Romans. In the time of Augustus it attained its greatest importance as a trade center, and was for three years the residence of Saint Paul, who afterward wrote his "Epistle to the Ephesians," while in prison at Rome, to the church at Ephesus. The second magnificent temple was destroyed by the Goths in 262 A. D., and they so plundered the city that it never again recovered its importance. The Third Ecumenical Council of the Christian church was held at Ephesus in 431, at which resolutions condemning Nestorius were agreed upon.

The famous temple of Diana, counted among the seven wonders of the world, was located a mile east of the city, and at the birth of Alexander the Great the Ephesians burned it to add luster to his name. Many contributions were given and heavy taxes levied for the purpose of rebuilding it with even greater splendor, the new structure being the greatest of Grecian temples and containing 130 columns. This remarkable structure was 225 feet wide and 423 feet long, and contained statues and pictures of the most noted Grecian masters. Nero robbed it of its treasures and the Goths burned it, and its destruction was finally accomplished by an edict issued in 381 against pagan worship by Theodosius I. After numerous excavations were made by Europeans, the site of the temple was discovered in 1869, and many interesting remains were secured. In 1899 the Austrian Institute at Ephesus excavated several valuable relics, among them statues, a great market place, and a remarkable theater. Aiasoluk, a small village, is near the site of the city.

EPHRAIM (ē'frȧ-ĭm), the second son of Joseph, the founder of the tribe of Ephraim. The Ephraimites occupied a fruitful district in the center of Palestine. Their possession included most of the province afterward called Samaria. Within it were many places of historical interest, especially those between the Jordan and the Mediterranean. The tribe of Ephraim for a long time was in possession of the ark and the tabernacle at Shiloh.

EPIC (ĕp'ĭk), a poem characterized by its narrative and descriptive style, especially one that celebrates in stately, formal verse the real or mythical achievements of heroes or great personages. Epic poetry is distinguished from lyric by giving prominence to the narration of action rather than the expression of emotion, and from drama in that the epic contains frequent allusions to the author as narrator. Among the great sacred epics of the world are Dante's "Divina Commedia" and Milton's "Paradise Lost." The heroic epics include Homer's "Iliad" and "Odyssey," Virgil's "Aeneid," Tasso's "Jerusalem Delivered," and Aristo's "Orlando Furioso." Among humorous epics are Pope's "Rape of the Lock," "Battle of the Mice," and "Reynard the Fox." Byron's "Childe Harold" is written in a narrative style, but abounds in sentiment, and is both epic and lyric. This is true of Burns's "Cotter's Saturday Night," Bryant's "Thanatopsis," and Longfellow's "Evangeline."

EPICTETUS (ep-ĭk-tē'tŭs), Greek Stoic philosopher, born in Hierapolis, in Phrygia, about 50 A. D.; died about 94 A. D. His early life was spent as a slave at Rome, where he became a nominal Stoic. After attaining his freedom, he studied philosophy, was driven into exile by Emperor Domitian, and settled in Nicopolis, in Epirus, near the scene of the Battle of Actium. His maxims were collected by his pupil Arrian and published in a work called "Encheiridion," meaning hand-book, and a number of "Commentaries." The works still extant show an earnestness and nobility of character rarely surpassed. Among his teachings may be enumerated the theory that education lies in learning to wish things to be as they really are, and in acquiring ability to distinguish our own from the possessions of others. In other words, the sole true cause of our acting lies in our opinions and judgments, under the direction of a will.

EPICUREANISM (ēp-ĭ-kū-rē'ȧn-ĭz'm). See **Epicurus.**

EPICURUS (ep-ĭ-kū'rŭs), famous Greek philosopher, born on the island of Samos in 342 B. C.; died in 270 B. C. He was the son of Neocles, who was a schoolmaster, and at the age of eighteen years went to Athens, where he

studied for a brief period under several masters, and later pursued the study of philosophy. He was influenced largely by the teachings of Anaxagoras and Democritus, and when 32 years of age opened a school of philosophy at Mitylene. Five years later he returned to Athens, where he founded a school of philosophy on a tract of land purchased by him and converted into a garden, from which his pupils were called "philosophers of the garden." Among his principal teachings may be enumerated the theory that happiness consists in living temperately, being kind to others, and feeling content with one's own condition, though he held pleasure to be the highest good. His school became a great center of learning, attracted vast numbers from Asia Minor and various portions of Greece, and was a prolific cause of stimulating thought and directing effort. His writings included a large number of volumes, according to some writers about 300, on "Natural Philosophy," "Justice," "Love," "Avoidance," "Atoms and the Vacuum," "Virtues," and numerous others.

Few of the writings of Epicurus are extant, though such fragments as "A treatise on Nature" and detached messages still exist, but his teachings are known from the speeches of Cicero, Diogenes, Laertius, and Lucretius. His doctrine, that pleasure is the highest good, led to the practice in life called *Epicurean.* It was understood by the Greeks, Romans, and later by the French societies to imply freedom in action and living, and one holding to this school is still called an *epicure.* Some writers think that his views in regard to pleasure have been largely overdrawn, or perverted to a more liberal application than he intended. It is certain that Epicurus was a man of deep research and that he added knowledge of material value. According to his views the cares of business arise from dependence on others, personal fear, and weakness. He taught that death, though the most terrible of evils, should not concern us, "since, when we are, death is not, and, when death is, we are not."

EPIDEMIC (ĕp-ĭ-dĕm'ĭk), a disease which attacks many persons at the same time, spreading suddenly, often extremely virulent and fatal at first, then gradually becoming spent and feeble, so that the earliest stages are usually the worst. The plague, cholera, influenza, and la grippe are epidemics, while scarlet fever, typhoid fever, smallpox, diphtheria, and chicken pox are usually so regarded. However, some of these are classed more generally as contagious diseases. All that can be said with certainty about epidemics is that at the beginning there must be some distempered conditions around us, and our systems be predisposed to the reception of the specific poison, which causes the disease.

EPIDERMIS (ĕp-ĭ-dĕr'mĭs), in anatomy, the cuticle or scarfskin, constituting the external layer of the skin and protecting inner ones. In man it is thickest on the palms of the hands and soles of the feet. It possesses an organized structure, but has no nerves or blood vessels. The outermost layer of cells covering the surface of plants, when there are several layers of tissue, is also called epidermis.

EPIGRAM (ĕp'ĭ-grăm), a name given by the Greeks to a poetic inscription on a public monument. It was applied originally to a short verse or poem having only one subject, and was finished by a witty or ingenious turn, but is now applied to any short composition expressed neatly and happily, as "The child is father of the man."

EPILEPSY (ĕp-ĭ-lĕp'sy), or **Falling Sickness,** a disease which derives its name from the suddenness of the attack. Usually the patient becomes unconscious and falls to the ground convulsed, turgid, and livid. This condition is generally accompanied by frothing at the mouth, a choking sound in the windpipe, biting of the tongue, and a suffocating tendency. After the patient reaches an exhausted, comatose condition, life is no longer in danger. Epilepsy may be caused by fear, passion, or an injury to the brain. In severe cases there is little hope of a cure, but patients may be afflicted with it from childhood until old age. Children often outgrow it at the period of adolescence.

EPILEPTICS (ĕp-ĭ-lĕp'tĭks), the persons afflicted with epilepsy. Within recent years considerable progress has been made in colonizing persons suffering with this disease, the purpose of which is to treat and care for them in the most satisfactory and efficient manner. The first colony for epileptics was established by Pastor von Bodelschwingh near Bielefeld, Germany, in 1867, and is known as the Bethel Colony. In 1890 the settlement contained, with its officers, physicians, nurses, and employees, about 3,600 persons. Under frugal treatment it has been possible to render much good to the unfortunates afflicted with the disease, the number of cured discharged at the end of each year aggregating twenty-one per cent. of the entire number treated, while about the same per cent. are discharged as incurable.

The marvelous development and success of the German colony led to a widespread movement in Europe and America to establish like institutions. Similar colonies are now located at Zurich, Switzerland; in Holland, France, and England, while the movement in the United States has attracted the attention of many State legislatures. The colony for epileptics in the State of New York is located at Sonyea; that of Pennsylvania, at Oakbourne; that of Massachusetts, at Monson; and that of New Jersey, at Skillman, though there are many others. Colonies of this class are usually located on farms comprising from 200 to 1,200 acres of land, on which the labor of those afflicted is utilized in facilitating the support. A late report shows that the number of epileptics in the

United States is 135,000, of which 9,500 are in Illinois, 12,500 in New York, and a proportional number in the other states and territories.

EPIPHANY (ĕ-pĭf'ă-nȳ), a festival of the Christian church, instituted to commemorate the visit of the Magi or wise men to the infant Jesus Christ, for whom they brought presents from the East. It is celebrated on January 6th and is sometimes termed the *manifestation of Christ to the Gentiles.*

EPIRUS (ĕ-pī'rŭs), a country of ancient Greece, surrounded by Illyria, the Ambracian Gulf, the Pindus Mountains, and the Ionian Sea. It corresponded quite nearly to modern Albania. Among the interesting towns were Donoa and Ambracia. The region was noted on account of its supply of heavy timber and the production of corn and domestic animals. Among the people were several colonies, the Grecians proper occupying largely the southern coastal district. Pyrrhus was the most celebrated king of Epirus and long waged war upon the Romans, but it finally became a province of Rome in 168 B. C. To prevent further insurrections the Romans plundered the country, razed seventy towns, and sold 150,000 of the people into slavery. It shared in the fortunes of the Roman and the Byzantine empires for many centuries, and was conquered by the Turks in the 15th century. Since the 14th century a large per cent. of the inhabitants have been made up of Albanians. A small strip of land situated east of the Arta River was ceded by Turkey to Greece in 1881, along with most of Thessaly.

EPISCOPAL CHURCH (ĕ-pĭs'kō-pąl), or **Protestant Episcopal Church,** a Christian denomination, the American branch of the Church of England. It became an independent ecclesiastical body in 1789, when it adopted its constitution at Philadelphia, Pa. It adheres strictly to the doctrine, discipline, and worship of the mother church, but the prayer book is altered so as to be consistent with the changes in the political condition of the country. Little progress was made in extension work until 1811, and within a period of ten years churches were organized in thirteen of the states. A movement toward suppressing the outward developments of what is known as ritualism caused extended controversies, especially in the general conventions of 1868 and 1874, and the two factions came to be known as the *low church* and the *high church* parties. Those opposing the ritual belong to the former, but the high churchmen are the dominant influence.

Changes in the prayer book or the constitution of the church can be made only by the general conference, which holds a session every three years. This body is composed of two houses, known as the house of clericals and lay deputies, and as the house of bishops. Within the United States there are 65 dioceses and 22 missionary jurisdictions, and an extensive line of missionary work is done in all the continents. In 1917 the church had 7,564 parishes and missions, 5,203 clergy, and 960,998 communicants. Among the organizations to promote Christian and charitable work are the Brotherhood of Saint Andrew, the Daughters of the King, the Church Temperance Society, and the Foreign and Domestic Missionary Society.

EPITAPH (ĕp'ĭ-tăf), an inscription upon a tomb or monument in honor or memory of the dead. The Egyptians first used epitaphs, usually with some prayer to Anubis or Osiris, and a similar custom was in vogue among the Greeks and Romans. Subsequently the practice became general throughout all Christian nations. The usual characteristic features in modern epitaphs are the name, date of birth and death, and some sentiment or expression of faith or affection. In many cases the sentiment is a quotation from the Bible, though epitaphs exemplify every variety of sense and taste, from lofty pathos to the vilest scurrility. Curious as it may seem, books containing collections of epitaphs are among the most amusing.

EPITHELIUM (ĕp-ĭ-thē'lĭ-ŭm), the layer of cells which lines the internal surfaces of the body, being continuous with the epidermis, which covers the external surface of the skin. Its main function is to act as a covering for the soft and moist surfaces that secrete the various fluids of the body. It lines the entire respiratory tract and the alimentary canal, and forms essential elements in the true glands, such as the pancreas and liver. The ciliated epithelium has hairlike projections known as cilia (q. v.), which have a continuous vibratory motion. Epithelium of this kind is found in the bronchial tubes, the air passages, the Eustachian tube, and the lachrymal appendages.

EPIZOA (ĕp-ĭ-zō'ă), the name given to parasitic animals which live upon the external surface of other animals, such as lice, itch insect, etc. See **Parasites.**

EPIZOÖTIC (ĕp-ĭ-zō-ŏt'ĭc), an epidemic disease among animals. It is usually mispronounced in America as *ep-i-zoo-tic.* The very fatal contagious catarrhal fever which raged throughout the country in 1870 and at different times since was a form of the disease. Thousands of horses and cattle died at that time. Some pathologists claim to trace a connection between this disease and la grippe. See **Influenza.**

E PLURIBUS UNUM, meaning one out of many, the national motto of the United States. Adams, Franklin, and Jefferson were a committee to prepare a seal and proposed this motto, which was adopted on July 4, 1776.

EPOCH (ĕp'ŏk), or **Era,** a point in the course of history from which preceding and ensuing years are computed. The creation of the world and the birth of Christ are the most important epochs, and on the former are based

many notable chronologies. The *Era of Creation* is placed by Catholics and Protestants at 4004 B. C., the *Era of Constantinople* at 5508 B. C., the *Era of Antioch* at 5502 B. C., and the *Era of Alexandria* at 5492 B. C. In Jewish writings the creation is placed at 3760 B. C., on which the Jews base their era. The *Christian Era,* a mode of computing time from the birth of Christ, went into extensive use among Europeans about the year 1000, though it was introduced in the 6th century. The event of Christ's birth took place four years earlier than the date written in our calendar. The *Julian Epoch* begins with 4713 and is based on the coincidents of the lunar, solar, and indictional periods. Mohammedans compute time from July 16, 662, this being the anniversary of the *Hegira* of Mohammed. Among the Chinese it is customary to compute time by cycles of sixty years, and to apply a different name to every cycle.

EPPING FOREST (ĕp'pĭng), a beautiful pleasure resort near London, England. It comprises 5,600 acres of magnificent woodland, rises 760 feet above sea level, and is improved by many structures and conveniences. In early ages it formed a portion of the hunting ground of the kings, and constituted a part of the forest that covered all of Essexshire. The crowded populations of London utilize this resort extensively for pleasure walking and driving.

EPSOM SALT (ĕp'sŭm sąlt), or **Magnesium Sulphate,** a cathartic salt, so named because it was first obtained from the famous mineral springs of Epsom, a market town of England. It is soluble in water and is used as a purgative. This salt is obtained by an artificial process from magnesian limestone, the latter being treated with sulphuric acid, or by dissolving it in boiling water and allowing the insoluble matter to settle. Afterward the water is evaporated from the solution, leaving the salt.

EPWORTH LEAGUE (ĕp'wŭrth lēg), a young people's religious society of the Methodist Episcopal Church, organized in 1889. In 1918 it had 31,340 chapters and a membership of 1,200,000. The chapters are classed as *senior* and *junior,* about one-fourth of the members belonging to the latter class. The object is to promote an earnest, practical, intelligent, and loyal spiritual ife in the young people of the church, and corresponds to societies maintained for similar purposes by the Baptist, Lutheran, Catholic, Presbyterian, and other churches. It is the largest denominational society in the world. The *Epworth Herald* is the official organ.

EQUATOR (ê-kwā'tĕr), the great circle imagined drawn around the earth midway between the poles, and which divides it into the Northern and Southern hemispheres. The distance from it to the poles is 90°. It forms the basis for measuring the latitude of places both north and south. Twice in the year, on Sept. 21 and March 21, the rays of the sun shine vertically on the Equator, when the days and nights are equal all over the earth, from which the name *equinox* has been derived. The *magnetic Equator* of the earth corresponds quite nearly to the geographical Equator, and marks the point midway between the magnetic poles. On the Equator the magnetic needle is horizontal, and, as the poles are neared, the dip of the needle increases, while at the poles it points vertically downward. Lines connecting places which have the same angle of dip are *isoclinal* and correspond in a very remarkable manner to the isothermal lines, showing a dependence of the intensity of magnetism on the distribution of the sun's heat.

EQUATORIAL TELESCOPE (ē-kwå-tō'-rĭ-ąl tĕl'ê-skōp) an instrument mounted upon a fixed axis parallel to the axis of the earth, which renders its motion parallel to the plane of the ecliptic. The principal axis turns upon a second movable axis, making it possible to continuously observe and note the right ascension and declination of heavenly bodies. Some equatorial telescopes revolve round the polar axis by an attached clockwork, which may be regulated to vary the velocity of rotation to meet the requirement in examining a particular heavenly body, such as a planet, a fixed star, a satellite, or the sun.

EQUESTRIAN ORDER (ê-kwĕs'trĭ-ąn), or **Equites,** an order of the people in ancient Rome. Originally they were a military organization and formed the cavalry of the army. Livy attributed their origin to Romulus, who is said to have selected the first three hundred out of the three chief divisions of the patricians. They were divided into *turmoe* of thirty men each and again subdivided into ten, and in the time of war were obliged to serve on horseback. The *equites* continued as an exclusively military body until 123 B. C., when a law was enacted that required that the jurors (*judices*) be selected from them. In addition they enjoyed the privilege of officiating as *publicani,* or farmers, of the public revenues. They wore a robe with a narrow purple border and a gold ring to distinguish them. During the republic they exercised much influence, but disappeared from the political life under the later emperors.

EQUINOX (ē'qwĭ-nŏks), the time at which the sun, in passing the Equator, renders the days and nights of equal length over the entire earth. This occurs when it enters one of the *equinoctial points,* the two equinoctial points being where the ecliptic and celestial equators intersect each other. The *vernal equinox* occurs on March 21, when the sun is in the first part of Aries, and the *autumnal equinox* takes place on Sept. 21, when it is at the first of Libra. At all other times of the year the length of the day and night is unequal, the greatest difference occurring at the poles. After the

vernal equinox, the sun passes from south to north, causing the days to lengthen in the Northern Hemisphere; while, after the autumnal equinox, it passes from north to south, causing the days to shorten in the Northern, but lengthen in the Southern Hemisphere. The precession of the equinoxes is due to the equinoctial points moving westward at the rate of 50″ in a year. The equinoxes, in March and September, are accompanied by gales which are known as *equinoctial storms.* They are most severe on the Atlantic coasts of America and Europe.

EQUITY, in law, a particular system of jurisprudence, which is based upon justice rather than precedent. It is sometimes defined as natural justice to distinguish it from the fixed and technical rules of law. In some countries, as in England, equity is administered by courts of chancery, but in some states the cases in equity are referred to the courts of law. The aim is to extend relief in causes which are not recognized in a strict sense by the law, hence the decisions are based upon modifying circumstances rather than upon the statutory law. Usually the plaintiff and defendant state their claim and defense in a formal statement, which is termed *pleadings,* and the question raised in this way constitutes the *issue.* In some instances the issues of fact are disposed of by the judge and jury, while in some countries the cases in equity are tried only to the court. In general, it may be said that courts of equity serve to bring all parties interested in a cause before the tribunal and adjust the rights of the several parties according to the circumstances which bear upon the issues.

ERA OF GOOD FEELING, the name applied to the period of United States history between 1817 and 1823, during the administration of President Monroe. At that time national political contests were suspended, the Democratic party had a large majority, and the Federalists had dwindled down to a very small number. It succeeded the War of 1812, when the new issues of tariff and internal improvements had not arisen, which soon after came into prominence and caused much political strife in Congress and the nation.

ÉRARD (ā-rär′), **Sébastien,** manufacturer of musical instruments, born in Strasburg, Germany, April 5, 1752; died in Paris, France, Aug. 5, 1831. At the age of seventeen he went to Paris, accompanying his brother, Jean Baptiste, to engage in the manufacture of pianos, producing his first instrument in 1777. Soon after the commencement of the French revolution he located a factory in London, but returned to Paris in 1796, where he became noted as a manufacturer of musical instruments. Among the inventions made by him are the grand piano, a double-action harp, and numerous improvements in the harp and piano.

ERASISTRATUS (ĕr-ā-sĭs′trā-tŭs), Greek physician, born at Iulis, in the island of Ceos, about 325 B. C. He was a pupil of Theophrastus and practiced for many years at Alexandria, Egypt, where he founded a school. The latter part of his life seems to have been spent at Samos in the study of anatomy. He was the first to distinguish between the motor nerves and the sensory nerves, and published a reasonably accurate description of the brain. In his writings he gives the view that the veins and arteries have their origin in the heart, hence he approached the discovery of the circulation of the blood.

ERASMUS (ē-răz′mŭs), **Desiderius,** philosopher and scholar, born in Rotterdam, Holland, Oct. 28, 1467; died in Basel, Switzerland, July 12, 1536. His name properly is Gerhard, meaning loved, though in accordance with the fashion among scholars of his age it was changed into the Latin and Greek equivalents. He studied at Deventer, where he displayed remarkable talents as a student of languages and literature. Later he entered a monastery near Delft and remained there as monk for six years. In 1492 he went to Paris to study six years, perfecting himself in theology and the humane sciences. He supported himself largely by giving private lectures. Soon after he went to England and became a student of Greek at Oxford under Finacre and Metcolet. Later he returned to Paris, enriched his knowledge by traveling in Germany and Italy, and became the teacher of Alexander Stuart, son of James IV. of Scotland, and with him visited numerous cities, but settled at Basel in 1514. In 1516 he published the first edition of the New Testament in Greek, this probably being his greatest work.

Erasmus took a middle ground on the issues of the Reformation, spending many of his later days in disputation with friends and foes, being unable to satisfy either party. The discussion with Luther on free will is among the most important, though there are many others from which he secured fame and consideration quite as lasting as were accorded to the more prominent men of letters. Many of the monarchs of Europe and others of influence and wealth sent him letters and presents as marks of friendship, and his correspondents included the most eminent men of learning. Among his writings are "Adagia," a collection of proverbs from the Greek and Latin, "The Christian Soldier's Dagger," "The Praise or Folly," a satire on kings and monks, and "Colloquia."

ERASTUS, Thomas, physician and theologian, born in the Canton of Aargau, Switzerland, Sept. 7, 1524; died Dec. 31, 1583. The real name of this celebrated man was Thomas Lieber, having translated it into the Greek according to the fashion of his time. He graduated at the University of Basel, traveled extensively, and later attained a doctor's degree at the University of Bologna. His writings and lectures

are numerous, and he exercised a marked influence upon medical theories and ecclesiastical and secular thought. He agreed with Zwingli on the doctrine of the Lord's Supper and insisted that the church cannot rightly excommunicate its members. Among his books are "On the Understanding of the Words of Christ" and "The Nullity of Church Censures."

ERCKMANN-CHATRIAN (ĕrk'män-shätrē-än'), a compound name of two French-Alsatian writers of fiction. They formed a literary partnership in 1848, and together produced literary works known in all parts of the world. The partnership ceased in 1889, owing to differences over the division of the profits, though afterward the former friendship was reëstablished. Émile Erckmann was born May 20, 1822, in Alsace, now belonging to Germany, and died March 14, 1899. Alexandre Chatrian was born in Lorraine, Dec. 2, 1826; died in Paris Sept. 4, 1890. Both were educated in colleges of recognized standing, showed early aptitude for literary polish, and together produced their first work in 1848, a drama entitled "Alsace in 1814." The entire productions of the two writers include many volumes, and cover all manner of interesting topics, especially romances.

EREBUS (ĕr'ē-bŭs), in mythology, the son of Chaos and Night. He was changed into a river as a punishment for assisting the Titans. The term Erebus was frequently applied to a portion of the pagan inferno, a dark and gloomy space beneath the earth, through which the souls of the just passed on their way to enjoy the eternal and delightful life of Elysium.

EREBUS AND TERROR, the names of two volcanoes in the Antarctic region, located in the northern part of South Victoria Land. They were discovered by Sir James C. Ross in 1841 and were so named from the two vessels used in the expedition. Mount Erebus is 12,370 feet high and is situated 30 miles east of Mount Terror, which has an elevation of 10,900 feet.

ERECHTHEUM (er-ekh-thē'um), the name of a sacred edifice on the Acropolis, in ancient Athens. It was so named from Erechtheus, a fabulous hero of Greece, and it is thought to have contained the shrine of that hero and of Athene. The original building was burned by the Persians, but a new temple was built on the same site in 393 B. C. and dedicated to the Ionic order. It had three porticos and contained the sacred olive tree of Athene and a salt spring said to have been made by the trident of Poseidon. The ruins of this building, located north of the Parthenon, contain the Porch of Caryatides, in which six female figures somewhat larger than life support the entablature.

ERFURT (ĕr'fo͝ort) a city of Germany, in the Prussian province of Saxony, 145 miles southwest of Berlin. It is conveniently connected by numerous railroad lines with the important commercial and educational centers of continental Europe. The cathedral, a splendid Gothic structure, is one of the finest in Germany. This structure has a famous bell, the Maria Gloriosa, which weighs thirteen tons. The University of Erfurt was founded in 1378, but was suppressed in 1816, and now ranks as an academy of science. Its buildings have been well maintained and its library contains about 75,000 volumes. The monastery is now called Martinsstift (Martin's establishment) and has been converted into an orphanage. It was the residence of Luther from 1501 to 1508. The surrounding country is agricultural. The city has modern facilities and produces woolen, cotton, silk, and linen goods, machinery, tobacco, leather, chemicals, and scientific instruments. The city was founded in the early part of the 5th century, when it was called Erpesford from its founder, Erpes. In the Middle Ages it grew rapidly, became strongly fortified, and until 1873 was counted a fortress of second rank. Owing to its convenient location, it has been a point of contention by foreign invaders, became a part of Prussia in 1803, and was the seat of the celebrated congress of Erfurt in 1808, which was attended by the Emperor of Russia, Napoleon, and various German monarchs. Population, 1910, 111,461.

ERGOT (ēr'gŭt), a fungus found in rye, wild rye, and other grasses, the principal symptom being that the seed, besides becoming black, grows elongated so as to resemble a rooster's spur, whence the name ergot comes. When the disease begins, sphacelae appear upon the pistils, and after a time a viscid fluid exudes from them. The disease is very fatal to the plants attacked, and, if eaten with sound grain is dangerous to both man and animals. It causes contraction of the minute arteries by acting on their muscular walls, and is useful to check bleeding in parturition. In large quantities it produces nausea, delirium, stupor, and death. On the western plains it appears largely in wild rye, often causing much damage to large herds of domestic animals.

ERIC (ĕr'ĭk), the name of several Swedish kings, who ruled at different times between 1154 and 1568. The name is the Scandinavian form of Henry, and was applied to several monarchs who ruled Sweden and Denmark separately, though some governed the whole of Scandinavia after the Union of Calmar.

ERICSSON (ĕr'ĭk-sŭn), **John,** Swedish-American engineer, born in Långbanshyttan, Sweden, July 31, 1803; died in New York City, May 8, 1889. He became an engineer cadet at the age of twelve years, entered the Swedish army at seventeen, and was promoted captain in 1827. Subsequently he constructed a flame engine, which gained a prize at London in 1828, and soon after produced in rapid succession an instrument for sea sounding, a hydrostatic weighing machine, a tubular steam boiler, and

numerous other useful machines. He emigrated to the United States in 1839. In 1853 he built the ship *Ericsson* and invented a caloric engine by which to propel it. The screw propeller was patented by him in 1836 and came into use the following year. It was later employed by the United States government in propelling the warship *Princeton*. In 1851 he exhibited several philosophical instruments at London, including a sea lead, a pyrometer, and an alarm barometer.



JOHN ERICSSON.

The United States government employed Ericsson in 1861 to construct several ironclad vessels. Under this contract he completed the *Monitor* on March 9, 1862, which was successful in combating with the ironclad ram *Virginia*. This little vessel contained a turret operated by machinery so that guns could be fired in any direction. Though the subject of jests by sailors, who named it a "cheese box on a raft," it became famous and marked an epoch in the Civil War. In 1881 he built the vessel called the *Destroyer* for the United States government. Among his more recent scientific inventions is an instrument for making computation of the intensity of the solar heat and other influences affecting the rotary motion of the earth. In accordance with the request of the Swedish government and his own wishes the remains of Ericsson were taken to Sweden and buried at his birthplace. They were transferred with distinguished honors in the United States ship *Baltimore* to Stockholm. There they were received with like honors and carried to the last resting place under government escort. See **Monitor.**

ERIC THE RED, celebrated Norwegian navigator, who became associated with Icelandic explorations in 982. The following year he sailed westward from Bredifiord and discovered Greenland. After returning to Iceland in 985, he organized an expedition of discovery and with fourteen vessels reached the coast of Greenland. His son, Lief Eric, discovered the northeastern coast of North America in 1001, explored a portion of its coast, and named it Markland or Finland.

ERIE (ē'rĭ), a city in Pennsylvania, county seat of Erie County, on Lake Erie. It is on the Pennsylvania, the Philadelphia and Erie, the Pittsburg, Bessemer and Lake Erie, the Lake Shore and Michigan Southern, and other railroads. The harbor is one of the best on Lake Erie, being the only harbor in Pennsylvania, and is protected by Presque Isle, a peninsula which forms a natural breakwater about six miles long. The city is midway between Cleveland and Buffalo, in close proximity to the coal and natural gas fields of Pennsylvania. It has a large export and import trade with the cities on the Great Lakes, being on the route of many steamship lines. The streets are well lighted and paved. They are lined with elegant mansions and beautified by fine trees and gardens. An abundant water supply is secured from the lake, the water being pumped into a tower 251 feet high, which is classed as the highest water pipe in the world.

Erie has an area of about seventy square miles. The noteworthy buildings include the county courthouse, the Federal building, the public library, and the high school. It has a number of fine public parks, a soldiers' monument, and several well-improved boulevards. Among the noted institutions are the Soldiers' Home, Saint Vincent's Hospital, Home for the Friendless, Erie Academy, Clark's Business College, Erie Art School, and Saint Benedictine Academy.

As an industrial and jobbing center it holds a high rank. It has extensive machine shops, refineries, and foundries. The manufactures include fabrics, lumber products, tobacco, beverages, machinery, ironware, and hardware. Erie occupies the site of Presque Isle, a French fort built in 1753. The English captured it in 1760. In the War of 1812 it was the headquarters of Commodore Perry. The first settlers came here in 1795 and it was incorporated in 1805. Population, 1900, 52,733; in 1910, 66,525.

ERIE, Battle of Lake, a naval engagement of the War of 1812, fought near the island of Put-in-Bay, in the western part of Lake Erie, on Sept. 10, 1813. The American fleet under Commodore Perry consisted of nine small vessels, which had been built hastily at Presque Isle, and the British fleet under Commodore Barclay had six vessels. Commodore Perry used the *Lawrence* as his flagship, on which the British concentrated their fire and disabled it, hence he was compelled to shift his flag to the *Niagara*. The fighting became general and the British were compelled to strike their colors. Perry reported the victory to the government officials in these words: "We have met the enemy, and they are ours—two ships, two brigs, one schooner, and one sloop." As a result of the battle the Americans secured control of the Great Lakes and the Northwest Territory.

ERIE CANAL, the largest and most important canal of the United States, extending from Buffalo to Albany, N. Y., a distance of 351 miles. The canal was first suggested by Gouverneur Morris and he was appointed at the head of a commission of seven members in 1810. The project was delayed by the War of 1812, but a law authorizing it was enacted in 1817, and the first canal boat passed through

from Buffalo on Nov. 4, 1825, Governor Clinton being a passenger on the same. This canal greatly revolutionized trade with the lakes and the interior, since railroads were yet unknown. By means of it the time of travel between Buffalo and Albany was shortened from twenty to ten days, and the freight per ton was reduced from $100 to $3. The canal as originally constructed was forty feet wide and four feet deep, and cost $7,602,000. In 1895 the sum of $9,000,000 was appropriated to deepen the canal to nine feet and otherwise improve it. However, the work cost more than twice that amount. Up to 1871 the propelling power consisted almost entirely of horses, though at that time steam-propelled boats were introduced, and at present electric motive power is used with success. However, the greatest share of freight is still carried in tow boats drawn by horses. The canal is twice carried over the Mohawk River on aqueducts, contains 72 locks, of which 57 are double-lift locks, and is considered one of the most scientific canals in the world.

ERIE, Fort, a fortified place in Welland County, Canada, on the Niagara River, nearly opposite the city of Buffalo, N. Y. It was occupied by the British under General Vincent, who abandoned and fired it with all its stores on May 28, 1813. The same day it was occupied by the Americans, who afterward withdrew from the Canadian shore, and the British rebuilt it. General Brown invaded Canada in July of the same year and required the fort to surrender. The fort was now strengthened by the Americans, and in August of the same year the British under General Drummond assaulted it and captured the main bastion of the fort, but a magazine blew up and rendered the attack unsuccessful. In November, 1814, the Americans finally abandoned Canada and Fort Erie was blown up.

ERIE, Lake, one of the five Great Lakes of North America, between lakes Huron and Ontario. It washes part of the northern boundary of New York, Ohio, and Pennsylvania, the eastern shore of Michigan, and the southern shore of the Province of Ontario. The discharges of lakes Superior, Michigan, and Huron flow into it through the Detroit River, while the outflow is into Lake Ontario by the Niagara River. Its width is from 30 to 65 miles; length, 260 miles, and area, 9,600 square miles. The Sandusky, Maumee, Detroit and Grand (in Canada) are the principal rivers flowing into it. Canal connections are maintained with the Hudson River by the Erie Canal, with the Ohio by the Ohio and Miami, and with Lake Ontario by the Welland. It has excellent fisheries and a large commerce. The naval victory gained by Commodore Perry over the British in the western part of the lake is commemorated by a monument at Cleveland and by a stone on the island of Gibraltar, near which the battle was fought. Among the chief harbors in the United States are those of Erie, Buffalo, Sandusky, Cleveland, Toledo, and Dunkirk. Those of Canada include Harrow, Rondeau, Port Rowan, and Welland.

ERITREA (ā-rē-trā'ā), or **Erythrea,** a possession of Italy, on the western coast of the Red Sea, extending as a narrow strip of country about 670 miles along the coast, from Nubia to French Somaliland. The area is about 50,500 square miles. It is inhabited chiefly by nomadic tribes of Arabs, but the southern part has some settlements of Afars or Danikils. A resident civil governor is nominated by the King of Italy and is under the direction of the Italian minister of foreign affairs. Farming is largely pastoral, its products being butter, meat, and hides, supplied by cattle, sheep, and goats. There are pearl fisheries of considerable importance along the coast, while the import and export trade is quite large. Massowah is the capital and local seat of government, with a population of 9,250. It is connected with Saate and several other points by railroad and telegraph lines. Numerous wars between the Italians and dervishes have occurred, though the boundary line was fixed at its present limit in 1897. Population, 1916, 279,551.

ERMAN (ĕr'män), **Adolf,** Egyptologist, born in Berlin, Germany, Oct. 31, 1854. His father was professor of physics in the University of Berlin, and he was educated at that institution and at Leipzig. In 1883 he was made associate professor of Egyptology at Leipzig, and two years later became director of the Egyptian department of history in the Royal Museum at Berlin, where he was appointed professor in 1892. Although he published many works of vast importance, his service to science is due chiefly to his work in the department of Egyptian grammar. Several of his publications have been widely translated and are considered standard texts. They include "Egyptian Grammar," "Formation of Plurals in the Egyptian," "Egypt and Egyptian Life in Ancient Times," "Flexion of Egyptian Verbs," and "Grammar of the Ancient Egyptians."

ERMINE (ĕr'mĭn), or **Stoat,** a small mammal allied to the weasel family, found in the



ERMINE.

northern portion of Europe, Asia, and America. The body in summer is reddish-brown above and white beneath, and in winter it is wholly

white, except the tip of its tail. Its body is about ten inches long, without the tail, which is about five inches. The fur is soft and silky and is used for ladies' winter garments, and in some countries for robes of kings, judges, and other high officials. When used as linings for cloaks, the black tufts of the tail are sewed to the skins at irregular intervals. The ermine lives in holes in the ground and under rocks, and feeds on mice, rats, birds, chickens, and other small animals, sucking the blood.

ERNE (ĕrn), a river and lake of Ireland, in Ulster County. The river rises in Lake Gowna and flows into Donegal Bay, passing through Lough Erne in Fermanagh County. It is sixty miles long and is navigable from Ballyshannon to the outlet. Lough Erne consists of two lakes, the upper and the lower, and is usually known as Lake Erne. It is rich in fish and eels, and the scenery is interesting and attractive.

EROSION (ē-rō'zhŭn), in geology, the influence of running water, waves, and wind in wearing away rocks and other substances. Immense quantities of silt are deposited at the mouths of rivers as deltas, which show that the geological structure of the earth's crust is changing from this agency. The erosion theory attributes the excavation of valleys and other depressions chiefly to the erosive power of water in the form of glaciers, instead of regarding them as due to depressions, cracks, or fissures in the strata produced by strains during upheavals through volcanic action.

ERRATIC BLOCKS, or **Erratics** (ĕr-răt'-ĭks), in geology, the boulders on the surface of the ground which have been transported from their original location by the action of glaciers and icebergs. They consist largely of granite, and in some cases were transported great distances from their original location. Many rocks of this class are found in the south central part of Canada and the north central part of the United States, extending from Saskatchewan through North and South Dakota and southward into Iowa.

ERSKINE (ĕr'skĭn), **Thomas, Lord,** orator and lawyer, born in Edinburgh, Scotland, Jan. 21, 1750; died Nov. 17, 1823. He was the youngest son of the Earl of Buchan, educated partly at Edinburgh and partly at the University of Saint Andrews, and entered the navy in 1764, though largely at his own displeasure. After serving in the navy four years and in the army seven, he entered upon the study of law at Cambridge, where he took a degree in 1778, and was called to the bar on July 3 of that year. His eminent success caused him to be elected to Parliament in 1783 for Portsmouth, which seat he held until he was raised to the peerage in 1806. He defended Stockdale, a bookseller, in 1789 on charges of libel brought for publishing a pamphlet in favor of Warren Hastings, in which his success in the art of addressing a jury was greatly admired.

Erskine lost the office of attorney-general to the Prince of Wales in 1792, on account of defending Thomas Paine, when the latter was prosecuted for publishing the second part of his "Rights of Man," though Erskine maintained the opinion that he deemed it right to defend a case even if not in full sympathy with the convictions and views of his client. The Prince of Wales, afterward George IV., made him keeper of his seals for the duchy of Cornwall in 1802, and in 1806 he was made peer and elevated to the dignity of lord chancellor. His speeches are unrivaled in the history of the British bar, and upon them rests his reputation. Among his publications are "View of the Causes and Consequences of the War with France."

ERYSIPELAS (ĕr-ĭ-sĭp'ē-lạs), an inflammatory disease of the skin. It is attended by fever and diffused redness and swelling of the parts affected, and later by peeling off of the scarf-skin in the milder forms, or by suppuration of the deeper parts in severer cases. There is usually considerable pain, with heat and tingling in the affected parts. The treatment consists for the most part in watching closely the progress of the case, keeping the bowels well regulated, and obviating special dangers as they may occur. Iron is sometimes used as a specific remedy. The disease is frequently an epidemic.

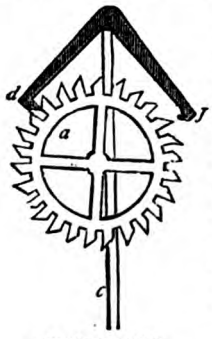
ERZERUM (ĕrz-rōōm'), a city of Turkish Armenia, situated in the southern portion of a wide valley, at an elevation of 6,200 feet, and surrounded by mountains of considerable elevation. It is the capital of a Turkish vilayet, which has an area of 19,180 square miles and a population of 645,728. The streets of the city are angular and the houses largely ancient, though there are numerous fine buildings, bazaars, and public edifices. The manufactures consist largely of ironware, clothing, copper, fabrics, and utensils. Erzerum forms an important strategical center. It has considerable trade with many points in Western Asia and the Persian pilgrims gather here in large numbers, when on their way to worship at Mecca. In 700 A. D. it fell into the hands of the Arabs, and was later successively conquered by the Byzantines, Mongols, and Turks. The Russians took possession of it in 1829 and again in 1878, though later restored it to the Turks. In 1916 the Russians, under Grand Duke Nicholas, after assaults lasting five days, captured it from the Turks. Population, 1914, 42,685.

ERZGEBIRGE (ĕrts'gẹ-bĕr-gẹ), a range of mountains in Europe, trending a distance of 120 miles and forming a natural boundary between Bohemia and Saxony. The name in German means Ore Mountains and originated from the wealth of iron, copper, cobalt, lead, silver, coal, and arsenic found in the region. The culminating peaks in Germany attain a height of 3,850 feet and the average elevation is 2,500 feet.

ESARHADDON (ē-sar-hăd'don), a celebrated King of Assyria, son and successor of Sennacherib. He reigned from 680 to 667 B. C., during which time he became distinguished as a general and an organizer. His father had destroyed Babylon in 691 in the Babylonian wars, but Esarhaddon rebuilt it, making it his southern capital, and greatly extended his dominion. He conquered the country west as far as Cyprus, attained large possessions in Media, and made himself King of Egypt and Ethiopia. Later Manasseh, King of Judea, was conquered and carried captive to Babylon.

ESAU (ē'sạ), the founder of the Edomites, eldest and favorite son of Isaac, and twin brother of Jacob. He was a rough, cunning hunter, and seems to have cared nothing for the morrow, but lived in joyous carelessness from day to day. It is recounted that he allowed Jacob to defraud him out of his birthright for a dish of pottage, even though it carried with it the covenant blessing and many temporal advantages. When he learned that Jacob had deceived him, he vowed his destruction, and the latter was sent to live with his uncle, Laban, in Padanaram, for safety. Esau married two Canaanitish women and later married his cousin Mahalath, and established himself in the region of Mount Seir, in Palestine. He afterward became reconciled with his brother Jacob, who had returned home to the burial of his father.

ESCANABA (ĕs-kȧ-nạ'lȧ), a city in Michigan, county seat of Delta County, near the central part of the northern peninsula of the State. It is on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railroads, has a good harbor on Green Bay, and is an important shipping point. The chief buildings include the county courthouse, the high school, and the public library. Among the manufactories are mills, iron foundries, and woodenware factories. Among the municipal improvements are waterworks, gas and electric lighting, sewerage, and street paving. It was settled in 1863 and incorporated as a city in 1883. Population, 1904, 11,098; 1910, 13,194.



ESCAPEMENT.

ESCAPEMENT (ĕs-kāp'mẹnt), a mechanical device intervening between the power and the time measurer of a clock or watch, and whose purpose is to secure uniformity in the rate of movement. It consists of two principal parts, the escapement wheel a and the lock d j, and through these the power imparts to the pendulum c, or balance wheel (time measurer), an impulse sufficient to overcome the friction and resistance of the atmosphere, and thus keeps up the vibration. These alternate motions of the lock serve to arrest and release the escape wheel at uniform intervals, thus governing the movement of the timepiece. The principle is the same whether the moving power consists of springs or weights. Among the different escapements in use are the chronometer, anchor, lever, cylinder, duplex, and horizontal.

ESCOBEDO (ȧs-kō-vȧ'thō), **Mariano,** Mexican soldier, born in Galeana, Nuevo Leon, Jan. 12, 1827; died in 1902. In 1847-48 he became celebrated on account of arming large numbers of Mexicans and attacking the United States forces engaged in the Mexican War, though later he fought with the Mexican army at Palo Alto. He is known by his daring exploits during French interference in Mexican affairs in 1862, and his resistance to the imperial general, Miramón, in 1867. The latter resulted in the capture of Emperor Maximilian and his shooting after a hasty court-martial. Escobedo was secretary of war under President Lerdo and opposed Diaz, which resulted in his arrest and trial by court-martial, though he was allowed freedom. In 1882-83 he held the office of president of the supreme military court of justice, but resigned in 1884 to retire from public life.

ESCURIAL (ĕs-kū'rĭ-ạl), or **Escorial,** a building about 30 miles northwest of Madrid, Spain, celebrated as a palace, church, convent, and burial place. It was built by Philip II. on a slope of the Sierra de Guadarrama, about 3,700 feet above sea level, and dedicated to Saint Lawrence in commemoration of the victory of Saint Quentin over the French on Saint Lawrence's day, Aug. 10, 1557. Since Saint Lawrence suffered martyrdom by being broiled to death on a sort of gridiron, its form is considered to be on the plan of a gridiron. The main building was begun in 1563 and completed after 21 years. This great building has a length of 740 feet, a width of 580, and a dome with a height of 220 feet. Its collection of pictures long ranked among the finest in Europe, but large numbers of the more noted were transferred to Madrid in 1837. A fire injured the library in 1691, but Ferdinand VII. restored it, and in 1808 the French army inflicted damages to the masonic portion. Marble tombs contain the remains of all the kings of Spain from Charles V. to Alfonso XII., except Philip V. and Ferdinand II., the tombs being in tiers over each other in niches constructed in the walls. A bolt of lightning struck the Escurial in 1872, by which serious damage resulted.

ESDRAELON (ĕs-drȧ-ē'lŏn), or **Plain of Jezreel,** a fertile valley of Palestine, extending from the Mediterranean toward the Jordan, along the eastern side of the Carmel range. It is drained by the Kishon River and noted for its present high state of cultivation, though prior to 1869 it was laid waste periodically by the

Arabs. This valley is the site of Gideon's victory over the Midianites and that of Napoleon over the Turks in 1799.

ESDRAS, Books of, the name of two apocryphal books of the Old Testament. They are usually given as the *First Book of Esdras* and the *Second Book of Esdras,* and generally appear as the first two books of the Apocrypha. The former contains a portion of *Nehemiah,* the *Book of Ezra,* and two chapters of *II Chronicles,* and was translated from the Hebrew. The latter, according to recent critics, was composed about the year 90 A. D., and was written in Hebrew or Greek. See **Bible.**

ESKIMOS (ĕs'kĭ-mōz), or **Esquimaux,** a race of people supposed to be of Turanian



ESKIMO FAMILY AND DOGS.

descent, found native in the northern part of North America, Greenland, the Arctic islands, and the northeastern portions of Asia. The name applied to them is supposed to be of Indian origin, meaning *eaters of raw fish,* though the designation they applied to themselves is *Inu-it.* There are at least three principal divisions of this race—the Eskimo proper, in Labrador; the Greenlanders; and those occupying the country west of Baffin Bay and extending westward along the Arctic region to a district about 400 miles west of Bering Strait. Their height and coarse, black hair correspond to those of the American Indians, but the color of the skin shows a tendency toward brown. The eyes are often oblique, the cheek bones are prominent, the nose is flattened, and the weight is quite large considering the average height. Their summer residence consists of tents made with poles and skins.

In the winter time the Eskimos build houses of snow and ice, though in some cases their habitations are permanent, being constructed of stone in which turf is used for cement. The food consists of the flesh of the walrus, whale, seal, and other animals, though this is usually eaten raw. They use a boat, or *kyak,* made of oiled skins with much skill. From fifty to several hundred inmates occupy a single house, which in the winter time is warmed by lamps consuming whale oil as fuel. The attire of the males and females is similar, consisting of trousers and a coat or sack, with a hood of skins drawn over the head.

Government among the Eskimos is tribal. The oldest are selected as chiefs, who officiate among the tribes and groups of tribes. Large numbers have been converted to Christianity by Danish missionaries, though some still adhere to totem worship. As hunters and fishers they show much skill with spears, arrows, and lances, these usually having bone or metal points. The Eskimo dog is their only domestic animal, and serves as a valuable help in hunting and drawing sledges. It is larger than the English pointer and has short, but strong, legs, and from its bushy tail has a wolfish appearance. By means of a team of trained dogs the Eskimo is able to travel sixty miles a day. The total number of Eskimos is now placed at 45,000.

ESKIMO DOG. See **Eskimos.**

ESMARCH (ĕs'märk), **Johannes,** distinguished surgeon, born at Tönning, Germany, Jan. 29, 1823. He studied at Kiel and Göttingen, served in the Danish War of 1848, and subsequently became chief physician of a hospital at Flensburg. In 1857 he was made professor at the University of Kiel, and served as physician general of the army in the Franco-German War of 1870-71. He was considered the greatest authority on gunshot wounds, and is the inventor of ambulances and the bloodless method of performing operations on the extremities of the body. Among his writings are "Contributions to Practical Chirurgery," "The Contest of Humanity Against the Woes of War," "Skillful Bloodless Operations," and "Handbook of Technical Chirurgery as Practiced in War."

ESPARTO (ĕs-pär'tō), a species of grass grown extensively in Spain and Northern Africa. It is especially valuable for its strong fiber, which is used in the manufacture of paper, maps, nets, and cordage. It has been acclimated in the United States and is grown to some extent as a commercial product.

ESPERANTO (ā-spā-rān'to), a universal language invented by L. L. Zamenhof, a scholar of Warsaw, Russia. He prepared an exhaustive grammar in that language in 1887, which has since been translated into about thirty of the leading languages, and a large number of publications are issued regularly to disseminate interest in its use. Esperanto societies are maintained in the leading cities of Europe and America. Regular courses of study are carried by many periodicals, such as the English *Review of Reviews*. The new language combines the more commendable features of the leading languages of Europe, in which respect it is superior to the Volapük (q. v.), and students may learn to read and speak it with facility in a comparatively short time. The English sentence, "The international language should be comprehensible to the whole educated world," appears as follows in Esperanto: "La lingvo internacia estas komprenita de la tuta mondo edukita."

Some one language has occupied a place of supremacy at all times. The Babylonian tongue was the language of diplomacy in the 2d century B. C. Alexander the Great made Greek the leading language, but it in turn gave way to Latin during the prosperity of Rome, which remained the language of scholars in Europe throughout the Middle Ages. French became the language of diplomacy in the 18th century. English sprang into use as the language of commerce in the 19th century, while German came to be indispensable to the scholar.

In a perfect system of communication each idea has its own separate symbol, as we find in the mathematical formulas and the chemical signs, but the connotation in the natural languages is very imperfect. English is the most imperfect in respect to spelling, while the inflected languages, as Latin and German, demand plural forms of the article, adjective, and verb with the plural nouns. An artificial language is intended to correct these and other difficulties. In Esperanto these faults are reduced to a minimum and each sound represents only one idea. Since it has no synonyms, puns are impossible in Esperanto. Those who have taken a leading part in the spread of the language maintain an organization known as the International Esperanto Congress. The fourth meeting of this body was held at Dresden, Germany, in 1908, at which about thirty countries were represented by delegates.

ESQUIMALT (ĕs-kwĭ'mąlt), a seaport of Canada, in British Columbia. It is located on Vancouver Island, three miles southwest of the city of Victoria, on the Strait of San Juan de Fuca. The harbor is landlocked and contains a navy yard and a dry dock. Esquimalt is the headquarters of the British Pacific squadron, is strongly fortified, and is connected by railway with the coal mines at Nanaimo. Population, 1916, 3,845.

ESSAY (ĕs'sā), a literary composition shorter and less formal than a treatise, and which embodies the opinion of the writer on some general subjects. The term is sometimes used interchangeably with the word *treatise*. The writing of essays as a separate form of literature began in the 16th century, although such ancient writers as Plutarch and Cicero are rightfully classed with the essayists. Montaigne, the eminent French writer, may be credited as the father of the essays. Voltaire, Lamartine, and Rousseau are among the leading French essayists, and those of Germany include Lessing, Schlegel, and Hermann Grimm. The following list contains the leading essays of European and American literature:

Joseph Addison's....."The Spectator"
Matthew Arnold's....."Essays in Criticism"
Francis Bacon's....."Of Studies"
Thomas Carlyle's....."Sartor Resartus"
Ralph W. Emerson's....."Conduct of Life"
Hermann Grimm's....."Fifteen Essays"
Oliver W. Holmes's..."Breakfast Table Series"
Washington Irving's....."Salmagundi Papers"
Samuel Johnson's....."Rambler"
Alphonse de Lamartine's....."Confidences"
Charles Lamb's....."Essays of Elia"
Gotthold E. Lessing's....."The Laokoon"
John Locke's....."Essay on the Understanding"
James Russell Lowell's....."Among My Books"
Thomas B. Macaulay's....."Milton"
Jean Jacques Rousseau's....."Emile" and ["Confessions"
John Ruskin's....."Sesame and Lilies"
Friedrich von Schlegel's..."Philosophy of Life"
Henry David Thoreau's....."Walden"
Jean Voltaire's....."Essay on the Nations"

ESSEN (ĕs'sęn), a city of Germany, in the kingdom of Prussia, about twenty miles northeast of Düsseldorf. Numerous railroads and electric car lines connect it with cities at a distance. The streets are well paved and its architecture is durable and imposing. The cathedral, founded in 873, contains many treasures of art. Other noteworthy buildings include the courthouse, the town hall, the municipal theater, and many schools and hospitals. A fine monument of Alfred Krupp stands in front of the town hall. Among its industries is the celebrated Krupp steel and iron works, rated among the most extensive establishments in the world. These works were founded with only two workmen in 1827, but at present occupy a site of 1,000 acres and give employment to 45,500 workmen. The guns, steel plate, and munitions of war produced at this establishment are known in all the civilized countries. Other manufactures include clothing, fabrics, tobacco, earthenware, and machinery. The municipality maintains systems of sewerage and waterworks. Essen was founded in the 9th century, but its growth is comparatively recent. In the 17th century it was captured by the Dutch and the Spaniards. Since 1813 it has belonged to Prussia. Population, 1910, 294,629.

ESSEQUIBO (ās-sā-kē'bō), the largest river of British Guiana, rises in the Tumuc Humac

Mountains, and flows into the Atlantic near Georgetown. It has a course of about 600 miles and its estuary is 20 miles wide. Several tributaries flow into it, chiefly from the west, and the region through which it flows has fine forests of ebony, locust, ironwood, and greenheart.

ESSEX, the name of a United States frigate used in the War of 1812, then under command of David Porter. The *Alert,* a British sloop of war, commanded by Captain Laugharne, made an attack upon the *Essex* on Aug. 13, 1812, but was captured by its opponent. Later the *Essex* was attacked at Valparaiso, South America, by two British men-of-war, the *Phoebe* and the *Cherub,* and her crew was forced to surrender. This engagement took place on March 28, 1814.

ESSEX (ĕs'sĕks), **Robert Devereux, Earl of,** born in Herefordshire, England, Nov. 10, 1567; executed Feb. 25, 1601. He was schooled at Cambridge, entered military service in the Netherlands under his stepfather, the Earl of Leicester, and attained the special favor of Queen Elizabeth, who showed him many distinguished honors. Later he was sent to assist Henry IV. of France against the Spaniards and rose rapidly to privy chancellor, earl, marshal, and chancellor of Cambridge. His activities in military affairs resulted in the capture of Cadiz in 1596, but his expedition in the following year was not successful and caused a quarrel with the queen, in which he turned his back upon her and she promptly boxed his ears. Essex became so excited that he drew his sword, threatening the life of the queen, and the two were never really reconciled. In 1599 he was appointed Lord Lieutenant of Ireland, and, after failing in satisfying his constituents, he led a band of 300 men to rid the country of Elizabeth's counselors, but especially those opposed to him personally. Being disappointed in obtaining general support, he was captured, tried for treason, condemned, and beheaded. For some time Elizabeth showed unwillingness to sign his death warrant, expecting him to implore her pardon, but his pride and dignity prevented this. He was a friend of literary men, gave an estate to Bacon, erected a monument to Spenser, and contributed some productions in poetry to English literature.

ESTATE, the interest which an owner may have in property, either real or personal. The term *fee simple* is applied where the ownership is absolute, hence the owner may encumber or sell it as he may choose. An estate in *fee tail* is one which is owned by the possessor, but he may dispose of it only to his own issue. A *life estate* pertains to the ownership of land, but the title is held only during the lifetime of the possessor. In general, the term estate has reference to the degree, quantity, nature, and extent of interest which a person has in real estate. From this circumstance we speak of an estate in *expectancy,* in *remainder,* in *common,* in *reversion,* etc.

ESTHER (ĕs'tĕr), meaning a star, the Persian name of Hadassah, daughter of Abihail, and foster daughter of Mordecai, an officer of the Persian king, Ahasuerus. When the misconduct of Vashti had resulted in the loss of her royal estate, all the fair young virgins appeared before Ahasuerus that he might choose a successor. He selected Hadassah, who received the name of Esther on account of her loveliness. She saved the Jews, her people, from the horrors of a universal massacre, had Haman hanged, and caused Mordecai to be made chief next to the king. These events took place during a feast, which is still observed by the Jews in the month of Adar, known as the feast of the Purim. Profane history does not speak of Esther or Ahasuerus, but the general opinion is that Ahasuerus was Xerxes and Esther, not his wife, but the favorite of his harem. The story is told in the book of Esther, probably written by Mordecai.

ESTHER, Book of, a book of the Old Testament, so named from Esther, a Jewish maiden and the foster-daughter of Mordecai. It recounts how Esther was raised to the position of queen by Ahasuerus, King of Persia, that she and her uncle Mordecai frustrated the plans of Haman to extirpate the Jews, that Haman fell and was succeeded by Mordecai, and that a festival was instituted to commemorate the deliverance of the Jews from their enemies. Recent critics think that it was written about 640 B. C. The language of the original manuscript is Hebrew, intermingled with numerous Persian words. The purpose of the book is to illustrate that God takes care of His people.

ESTHETICS. See **Aesthetics.**

ETCHING. See **Engraving.**

ETESIAN WINDS (ē-tē'zhạn), the name of winds that prevail in the southern part of Europe during the summer season. They blow from the north and northeast across the Mediterranean, and are due to the sun heating the surface under the Tropic of Cancer, causing the air to be drawn in over the desert of Sahara. Though the air is charged with moisture in passing across the Mediterranean, the clouds are dispersed when they reach the margin of the hot sands and the vapor is dissipated in the rarefied air.

ETHELBERT (ĕth'ĕl-bĕrt), King of Kent, born about 545; died in 616. He succeeded his father in 560 and became the most powerful prince of the heptarchy. Christianity was introduced into Britain during his reign through the influence of his wife, Queen Bertha, who was a daughter of the King of Paris. At this time Saint Augustine flourished in England and through his influence many conversions were made. Ethelbert published the first written code of laws issued to the Anglo-Saxons.

ETHELBERT, King of England, son and successor of Ethelwulf, died in 866. He succeeded his father in 857 and became sole king after the death of his brother Ethelbald, in 860. The Northmen invaded England during his reign and sacked Winchester and Kent.

ETHELRED I. (ĕth'ĕl-rĕd), King of England, son of Ethelwulf, died in 871. He succeeded his brother Ethelbert in 866 and immediately engaged in a war against the Danes, who invaded and conquered a large part of his kingdom. He was killed in a battle with the Danes, at Reading, and was succeeded by Alfred the Great. See **England.**

ETHELRED II., King of England, son of Edgar, born about 968; died in 1016. He ascended the throne in 978 as successor of his brother, Edward the Martyr. He was called the Unready, on account of a want of vigor and capacity. His reign was marked by numerous incursions of the Danes. In 1002 he ordered all the Danes in England to be executed, the victims probably including Gunhild, the sister of Sweyn, King of Denmark. The latter promptly invaded England and ravaged the country for four years. A second war with Denmark broke out in 1015, when Canute, son of Sweyn, overran a large territory.

ETHELWULF (ĕth'ĕl-wo͝olf), King of the Anglo-Saxons, son and successor of Egbert, died in 858. He succeeded his father in 836 and most of his reign was disturbed by incursions of the Danes, who captured London in 851. Ethelwulf defeated the Danes at Okely, but they retained their settlement on the isle of Thanet. In 855 he visited Rome, where his son Alfred the Great received the sacrament of confirmation. On returning to England, he found that his son Ethelbald had usurped the kingdom. In order to adjust the difficulties, he granted the latter the government of Wessex.

ETHER (ē'thĕr), in astronomy and physics, the tenuous fluid that fills all space. It is regarded the medium for the transmission of light, heat, and electric action, through the molecules of solids and liquids as well as throughout all gases. This medium is thought to be more elastic than any ordinary form of matter. Electric and magnetic phenomena are but strains and pulsations in the ether. Physicists assume the existence of ether from the wave theory of the motion of light (q. v.).

ETHER, the name of a volatile liquid, usually divided into two classes known as simple ether and compound ether, or as ether and ethereal salt. These liquids are fragrant substances, burn easily, and have a wide use in medicine. Ether is employed in the solution of iodine, sulphur, phosphorus, strychnine, and other alkaloids. It is useful in the preparation of freezing mixtures. When inhaled, it produces intoxication. Sulphuric ether, so called from the use of sulphuric acid in its preparation, is employed to dissolve fats and resins. It is much used in medicine as a stimulant and anaesthetic.

ETHICS (ĕth'ĭks), or **Moral Science,** the science which relates to human duty. It investigates the nature and the right of conduct, actions, and aims, embracing the supreme good and the ultimate ground of obligation. Writers usually treat the science of ethics under two divisions—theoretical and practical. *Theoretical ethics* aims to ascertain the principles of the ideal moral manhood and life, while *practical ethics* applies these principles in directing man to the attainment of the ideal character and life.

Ethics as a science is frequently compared in various aspects to geometry. In geometry we have an intuitive idea of extension; then special forms of extension, as a line, a circle, etc.; and finally we arrive at intuitive truths called *axioms.* Similarly, in ethics we first have an intuitive idea of right; then an idea of particular forms of right, as kindness, honesty, etc.; and ultimately recognize certain principles, as "it is right to be kind," "it is our duty to be honest," which may be regarded *moral axioms.* Various systems of ethics have been proposed, all differing more or less widely in their conclusions as to the origin and nature of the faculty by which human duty is recognized. Many of the systems had their origin in antiquity, and with them the names of Socrates, Plato, Epicurus, Aristotle, and the Stoics are associated. With the introduction of Christianity ethical speculation turned on a new element, and among Christians moral obligation came to be based on the injunctions of the Scriptures.

Most modern writers regard the true, the beautiful, and the good as the three rational ideas of the mind, and of these the good, which is by some called the right, is held to be the highest idea. There has been a wide difference of opinion as to the question of right, the essential query being as to what it is that makes a thing right. Among the answers proposed are utility, highest happiness, divine law, the divine nature, and the eternal nature of things. Those holding to the view founded on *utility* urge that whatever is best adapted to the welfare of man is right, while the opposite things are regarded as wrong, because they retard the individual and the race in progress toward the ideal life. Those holding that right is based on the *highest happiness* of the individual similarly commend all that is essential to the happiness of man. By *divine law* is meant the revealed will of God, which some writers hold to be the ultimate right, but there is a wide difference of opinion as to what the revealed will of God is, which is likewise the case of the character of *divine nature.* Those holding that right is based on the *eternal nature of things* regard right and wrong as self-existent. Viewed from this aspect, they are said to have no origin, and that they are eternal.

The view that right and wrong are eternal principles is probably correct, since we cannot conceive a condition under which either can change or be terminated. When looked upon from this high plane, we conceive that right is wrapped up in the universe, one ever-existing ultimate principle.

Locke, in his "Essay on the Understanding," assailed the theory that morality is intuitive, and urged that there are no principles universally received among men, that children are not possessed of any moral rules, and that moral rules require a reason to be given for them, these all being conclusive that virtue is not innate. In reply to this view, writers have urged that all nations agree in enjoining some moral rule, but this is a departure from the original question, since we are to determine which of any opposite standards of morality is correct, as, for instance, monogamy or polygamy. Those who oppose the idea of innate virtue usually hold that the idea of right is the product of education. According to this view virtue depends wholly upon the manner of instruction, which likewise determines how the individual will class conduct in the categories of right and wrong. Others hold that education does not account wholly for the origin of the idea, but refer its development at least partially to instinct. In the philosophy of Kant, reason is held to recognize the obligation of right conduct, and action is classed as good only when it is done from a good motive, though the motive must be entirely freed from natural inclination to the act performed. Adam Smith, in his "Theory of Moral Sentiments," suggests that the sympathetic feelings of the impartial and well-informed witness of an act constitute the criterion of right, while William Paley (1743-1805) holds that virtue consists in doing good to mankind for the sake of everlasting happiness.

ETHIOPIA (ē-thĭ-ō′pĭ-à), the Kush of sacred history, the ancient name applied to all the nations inhabiting the Southern Hemisphere, as known in early ages. However, some writers applied the name to the dark-brown or black-colored people, who are generally spoken of as Ethiopians, meaning *sunburned*. Later it had reference particularly to the country lying south of Egypt and the Red Sea, which corresponded to modern Abyssinia, Nubia, Kordofan, and other districts, though the boundary was not clearly defined. It was also applied to an island formed by two tributaries of the Nile, known as the kingdom of Meroë, whose capital was Napata. This island was fertile, producing an abundance of cereals, animals, and metals. It was given credit as the site of an oracle of Jupiter Ammon. Ethiopia, as a country, had a large trade with Egypt, Libya, Carthage, Arabia, and even India, but it attained its greatest prosperity about 1000 B. C., and formed a distinguished and powerful kingdom of ancient history. About the middle of the 8th century B. C. it became independent of Egypt, secured a predominating influence in the valley of the Nile, and imposed a dynasty on Lower Egypt.

The Persian Cambyses invaded Ethiopia in the 6th century B. C., though independence was maintained until it became a possession of the Romans in the reign of Augustus, the Ethiopian queen, Candace, becoming one of his vassals. The only evidences remaining of the ancient civilization of Ethiopia are numerous ruins of monuments and temples on which battles, religious ceremonies, and the industries are represented by sculptures. Their first king was Menelihek, who is supposed to have been the son of Solomon and the Queen of Sheba. The names of thirty kings and queens have been found sculptured on some of the ruins. Later the country came to be known as Abyssinia, but the monarchs of the present Abyssinia still designate themselves rulers of Ethiopia. The language of the Ethiopians, more correctly called the Geez language, was introduced from South Arabia, and formed the ancient ecclesiastical and official language of Abyssinia. Semitic in construction, it resembles the Hebrew, Aramaic, and Arabic. The modern nomadic tribes of the Sudan and Tigré speak a language quite closely allied to it. The literature of the Ethiopian language includes a translation of the Old and New Testaments and the Apocrypha, besides other important Christian literature.

ETHNOLOGY (ĕth-nŏl′ŏ-gў), the science which treats of the various races of mankind, investigates their distribution, and attempts to trace them to their origin. The science was developed from *ethnography*, which relates to particular tribes and localities, and to which it has a relation similar to the connection between geology and geography. *Anthropology* is the general science or natural history of mankind, of which ethnology and ethnography are important branches, while anthropology again is a branch of *biology*. In this article we can give only the leading facts of the unity or plurality of the species of mankind, since the whole study covers a wide range of details to be investigated. The distribution of man is much more general than that of lower animals, owing to the greater power of adaptation to change of circumstances. On account of this, man is found in all climatic zones and at all elevations above sea level, except only the small areas above the snow line.

The view that all mankind descended from a single family or species is the one most commonly supported. This view holds that Adam and Eve were the first parents, the common progenitors of all, racial differences now existing being attributed to climatic influences acting on individual families for a long period of time. Another view is that the various types have not descended from a single family, but

were created separately in different localities. The advocates of this theory maintain that the physical form, personal characteristics and general appearance of mankind could not have been so greatly diversified, as demonstrated by the different races, through mere climatic conditions. However, the difference in color, stature, size, and intelligence is largely overcome by the anatomical structure, which is invariably the same in all races. Besides, the racial differences are characterized by almost insensible gradation, which points to a gradual modification of an original race through changes in external circumstances, by means of which the principal species were produced. According to this view, it is assumed that all the varieties of races have descended from the Caucasian. Other evidences pointing to a single parent family are found in the similarity of earlier myths and legends, from which it is reasonably certain that the remote ancestors of the various races originally dwelt together. There is a close resemblance of the language of widely separated races, this being regarded the strongest proof of the early unity. By extended comparisons many scholars have been led to believe that the languages had their origin in the one parent nation, which dwelt in the neighborhood of Mount Ararat in prehistoric times.

Various classifications of mankind have been attempted. However, it has been difficult to find physical characteristics that belong exclusively to a single race, though there are some that predominate in certain races. The Dutch anatomist, Pieter Camper (1722-1789), attempted to make a scientific racial distinction by measurement of the facial angle. Though Camper's method illustrates nicely existing differences, they may be paralleled quite as distinctly by variations found in a single community. He classifies, for instance, the facial angle of the anthropoid apes at 42°, the African Negro at 70°, and the Europeans at 80°. J. F. Blumenbach (1752-1840), a German ethnologist, classified the human family into five races, basing the distinction on the differences found in the shape of the head, while Cuvier classified mankind in three divisions. As classified by this writer, the races are Caucasian, Mongolian, Ethiopian, Malay, and American, the two last mentioned being considered by him as subdivisions of the Mongolian. There is a more recent classification into three strongly marked types, the Caucasian, Mongolian, and Negro, and the three secondary races, the Malay, American, and Australian.

The *Caucasian* race is found in Southwestern Asia and most of Europe and America, and is widely distributed in small colonies in other portions. The *Negro* type prevails most largely in Africa and the *Mongolian* in portions of Eurasia not occupied by the Caucasian. Among the chief characteristics of the Caucasians are a round, oval face, fair complexion, arched forehead, symmetrical features, vertical teeth, smooth hair, and ample beard. The Mongolians have an angular face, broad head, oblique eyes, straight, coarse, black hair, high cheek bones, pale lemon to brownish-yellow skin, and a scanty beard. This race includes the inhabitants of most of Asia, the Laps and Finns of Northern Europe, the Magyars of Hungary and the Turks. The Eskimos, who inhabit the northern portion of North America and Northeastern Asia, are commonly classed with this race. The Negro race is characterized by a narrow and elongated head, projecting jaws, thick lips, crisp, curly hair, black or dusky skin, scanty beard on upper lip, and broad feet. It shows great differences in civilization, ranging from the cruel and vindictive Gallas to the debased Hottentots, from the cringing slave to most profound and enlightened scholars. This race is found in large numbers on the continent of Africa and has migrated to all portions of the warmer zones. The *Malay* race resembles the Mongolian. However, the eyes are horizontal, the hair is coarse and straight, and the skin is mostly a dark olive color. It is found in large numbers on the island of Madagascar, the southern Malay peninsula, and the islands of the Indian and Pacific oceans.

The *Australian* race is considered a sub-species of the Papuan branch of the Malays. It is characterized by deep-set eyes, large head, abundant beard, dark hair, and dark brown skin. In civilization it is wholly destitute and has shown little, if any, tendency to improve under a system of education. The *American* race resembles the Mongolian in some respects, though it is characterized by the top of the skull being more rounded and the sides less angular. This race once occupied all of America, though since the discovery and settlement it has been more or less assimilated. This is true especially of South and Central America, where the most highly advanced tribes of this race were found. At the time of discovery of America the people of the Andean plateaus were advanced in civilization, understood the art of working metals, and possessed remarkable temples, tombs, aqueducts, and pyramids, while those of Central America showed evidences of a still higher and more ancient civilization. The former probably were of Asiatic origin, while the latter have been traced by some writers to a Semitic or an Egyptian source. Placing the entire population of the earth at 1,500,000,000, the numerical strength of the different races is as follows: Mongolian, 650,000,000; Caucasian, 575,000,000; Negro, 175,000,000; Malay, 40,000,000; America, including all of the red race, 20,000,000; Australian and mixed races, 40,000,000.

ETIOLATION (ē-tĭ-ō-lā'shŭn), the process of bleaching plants by excluding the light of the sun. It is made use of in bleaching celery,

by which it is rendered quite tender and less acrid. Plants subjected to etiolation for some time become pale and almost colorless, since no chlorophyll is produced in the absence of sunlight. See **Chlorophyll.**

ETNA (ĕt'nȧ), a borough of Pennsylvania, in Allegheny County, on the Allegheny River, opposite the city of Pittsburg. It is on the Pennsylvania and the Pittsburg and Western railroads, and has electric railway facilities. Etna has extensive furnaces, rolling mills, and machine shops. Population, 1910, 5,384.

ETNA, or **Aetna,** the most celebrated volcano in Europe, situated in Catania, Sicily, towering 10,865 feet above sea level. This mountain rises abruptly from the sea, having a circumference of over one hundred miles at the base, and ends in a single cone, in which a crater nearly three miles in circumference and 1,000 feet deep has been formed. A number of smaller cones are situated on the side of the mountain, the principal one being Monti Rossi, formed during the eruption of 1669. The mountain contains three climatic zones—the lower mild region, the central temperate, and the upper or snow covered. In the milder regions many varieties of lemons, oranges, date palms, olives, almonds, figs, and bananas are cultivated. The temperate belt has forests of oak, birch, chestnut, cork oak, maple, and pine, and in the upper part is a desert region covered partly with stunted vegetation and partly with ashes, lava, and sand, and much of it is buried most of the year with snow. A splendid view of the whole of Sicily, Malta, Calabria, and the Lipari Islands is obtained from the summit. At the height of 9,080 feet is an observatory, which is the highest inhabitated structure of Europe.

Several great eruptions of Mount Etna occurred long before the Trojan wars. They are related in the mythical writings of the ancients. The earliest to which a definite date is given occurred in 475 B. C. and the most remarkable overwhelmed Catania in 1169, when 15,000 persons were destroyed. In an eruption in 1329 a new crater opened. About a century later, in 1444, a large cone formation fell into the crater during an eruption, and in 1669 a chasm twelve miles long burst open and lava flowed over the country for forty consecutive days. An earthquake accompanied the eruption in 1693 and caused the destruction of 60,000 lives. Vast eruptions occurred in 1832, 1853, 1865, 1874, and 1879, and there were numerous minor manifestations of external disturbances, numbering in all about one hundred, fully twenty of which occurred in the last century. Premonitory symptoms generally precede eruptions, thus giving ample warning to the people that danger is imminent.

ETON COLLEGE (ē'tŭn), an educational institution situated in Eton, England, about twenty miles from London. It was founded by Henry VI. in 1440, though its completion was retarded by political contentions until 1523. The institution is managed by a board or governing body, whose members are nominated by learned electors, including those of Oxford and Cambridge. Students from Eton may obtain valuable scholarships at Cambridge on merit, which is determined by competitive examinations. The buildings are substantial and convenient and associated with them are libraries, apparatus, a beautiful campus, and several parks. The attendance numbers about 1,000. Its courses of study are still based somewhat on the mediaeval idea that Greek and Latin are the basis of all good education. Among its distinguished graduates are Fielding, Fox, Chatham, Bolingbroke, Channing, Gray, Hallam, Wellington, Shelley, and Gladstone.

ETRURIA (ē-trōō'rĭ-ȧ), the ancient name of the portion of Italy which is situated south of the valley of the Arno and west of the Tiber and the Apennines. In its greater prosperity it embraced the valley of the Arno, extending south of the Tiber, when it included the valley of the Po. For practical purposes it may be said that Etruria corresponded to modern Tuscany, but included several adjoining regions. The traditional history of the Etruscans begins about 1044 B. C., and its fairly authentic history precedes the foundation of Rome more than two centuries. The state was formed as a confederation of twelve great cities or cantons, each of which constituted a representative republic. Among the most flourishing of these cities were Cortona, Veii, Caere, Volsinii, Tarquinii, and Perusia. Veii was a rival of Rome for four centuries, and in its prosperity covered sixteen square miles, but was destroyed under Camillus in 396 B. C. The famous tomb of the Tarquins is located at Caere. Volsinii resisted Roman attacks for many years and constituted one of the most powerful centers of Etruscan strength.

The naval power of the Etruscans was a strong element in their prosperity, enabling them to control large portions of the Mediterranean, establish supremacy over central and northern Italy, and include Rome itself within their territory for several centuries. From them the Romans secured the circus, many arts of industry, architectural methods, and the gladiatorial combats. They formed an alliance with the Carthaginians in 538 B. C. for the purpose of expelling Greek colonists from Corsica, fought against the Greek colony of Cumae in 525 B. C., and were rated the greatest military power of Italy in 467 B. C., though two years later their strength was partly shattered by the Greeks. Subsequently their territory was invaded by the Gauls, Samnites, Greeks, and Romans. The Roman victory over Veii in 396 B. C. completely destroyed Etruscan power, while their last determined resistance ended at the Battle of Lake Vadimonian in 283 B. C. Even after this their

state was considered an independent ally of Rome, though Roman customs were gradually adopted until the final union was effected in 89 B. C., after which many of the leading families of Etruria attained to high positions in the Roman government.

The name applied to the people of Etruria by the Romans was *Etrusci,* while the Greeks called them *Tyrrheni.* These people constituted a sturdy race. They were characterized by black hair, a dark color, and a large head, and more nearly resembled the people of Western Asia than the Europeans. Their civilization was marked by culture, a definite literature, codified laws, and a flourishing commerce. Although their poems, dramas, and histories are numbered among the extinct writings of the past ages, we know something of their ability to compound and apply medicine, calculate mathematical and astronomical problems, mine and work metals, build highways, and construct architectural edifices by studying their ruins and deciphering the inscriptions found on monuments and in the tombs.

Many products of the Etruscans are extant, such as vases, lamps, and utensils. The vases made by this race are especially noteworthy, being ornamented by bands of beautiful foliage and figures of a highly artistic character. It is known from excavations that their homes were adorned with decorated walls, mirrors, jewelry, pottery, and convenient furniture, though in art they borrowed largely from the Greeks. Many of the exquisitely painted vases known and preserved as Etruscan were undoubtedly the production of Grecian workmen, for the reason that many of the inscriptions are in the Greek. The language of the Etruscans is known as Rasena and was spoken for about 1,000 years before the Christian era, when it gave way to the Latin. Numerous coins and gems bearing inscriptions in Rasena are extant.

ETRURIA, a kingdom founded in Italy by Napoleon I. in 1801. It comprised the territory of Tuscany and was governed by the Bourbons of Parma until 1808, when it was incorporated with the empire of France. Elise Bacciocchi, a sister of Napoleon, was made Grand Duchess of Tuscany in 1809, but it reverted to Ferdinand III. after the fall of Napoleon in 1814.

ETRUSCAN VASES (ĕ-trŭs'kạn). See **Etruria.**

ETTY (ĕt'tĭ), **William,** painter, born at York, England, March 10, 1787; died Nov. 13, 1849. He was apprenticed to a printer in Hull and studied painting at the Royal Academy in London. Subsequently he traveled in Europe, visiting the art galleries of Paris, Venice, and Florence. In 1828 he was made a member of the Royal Academy in recognition of his painting entitled "Pandora Crowned by the Seasons." His work has been criticised on account of many features being copied, though the composition and coloring have been commended. Among his chief works are "Head of a Cardinal," "Ulysses and the Sirens," "The Combat," "Joan of Arc," and "David's Chief Captain."

ETYMOLOGY (ĕt-ĭ-mŏl'ô-jў), that branch of philology which treats of the origin, form, and meaning of words. Numerous Greek philosophers, including Plato, the grammarians of Alexandria, the Roman Varro, and scholiasts of different ages, wrote on etymology and traced the origin and history of particular words and forms of language. In more recent times the intense interest given to the investigation of Sanskrit has led to its scientific study. By means of extended investigations language has been classed in groups and families and the similar and dissimilar words have been studied from the standpoint of relationship and origin. This has led to a recognition of the fact that the growth of language is not accidental or premeditated, but enlarges or declines under certain laws. In grammar etymology is the division which treats of the parts of speech, their inflections, and the elements of the sentences.

EUBOEA (û-bē'à), an island of the Aegean Sea, formerly called Negroponte. It is ninety miles long and thirty miles broad at its widest point, and is the largest island in the Aegean Sea. The narrow channels of Talanti and Egripo (*Euripus*) separate it from Greece. Much of the surface is fertile and well wooded, though several mountain peaks rise to a height of about 7,000 feet. Chalcis and Karysto are the principal towns and trading centers. Besides minerals, there are productions of live stock, cereals, and fruits. Euboea was settled by the Ionians in 1100 B. C., after which it became the home of Aristotle and the seat of the Euboean school of philosophy. Athens subdued it after the Persian wars and it became a possession of the Turks in 1470. It is now a province of the kingdom of Greece. Population, 1917, 107,218.

EUCALYPTUS (ū-kà-lĭp'tŭs), a genus of trees, mostly native to Australia, which grow to the height of 480 to 500 feet, and form one of the most characteristic features of the vegetation in that part of the world. The leaves, instead of having one of their surfaces toward the sky, often grow with each side equally exposed to the light. Many of the species abound in resinous secretions and are known as gum trees. The bark is thick and hard, containing a large per cent. of tannin. In the red gum, bay king, and iron bark species, a red juice flows freely from a wound and hardens into irregular, inodorous, transparent masses called *eucalyptin,* which is analogous to tannin. The wood is used extensively for shipbuilding. A species of the eucalyptus known as the blue gum tree has been introduced into Cape Colony, Algeria, Mexico, Roman Campagna, and elsewhere. The climate and soil of many parts of California

and Florida are well fitted for the cultivation of the eucalyptus tree, hence it has been introduced with good results. It has acquired a reputation for drying marshy soils and absorbing malaria, on account of which it is called



EUCALYPTUS.

the fever tree. A saccharine substance similar to sugar, a powder having the qualities of quinine, and a secretion resembling manna are obtained from these trees.

EUCHRE (ū'kẽr), a game of cards played by two, three, or four persons, but only the aces, kings, queens, jacks, tens, nines, and eights are used. The cards rank in the order named, except that the trump suit jack is called the *right bower,* which is the highest, while the jack of the next suit which is like in color is called the *left bower,* hence is the second highest card. The game is one of the most popular played with cards.

EUCLID (ū'klĭd), Greek mathematician, born in Alexandria, Egypt, about 300 B. C. He belonged to the Platonic school of philosophy and taught mathematics in the famous University of Alexandria, in the reign of Ptolemy I., where he made prodigious advancement by his vigorous methods. His "Elements of Geometry," published first in thirteen and later in fifteen books, has, perhaps, never been excelled. However, two of these are generally attributed to Hypsicles. Besides this work, he wrote treatises on music, optics, and astronomy. The texts of the "Elements" have been translated into many languages, and, while they may not be used in their entirety by different schools, they form the basis of all logical mathematical reasoning.

EUDIOMETER (ū-dĭ-ŏm'ẽ-tẽr), an instrument used to determine the composition of gases. Priestley invented an apparatus of this kind to analyze atmospheric air and determine its proportion of oxygen. Many forms of the eudiometer are now in use, but the kind employed most extensively is a U or V shaped graduated glass tube, one end of which is closed and provided with electrodes fused into the glass. The air is tested by removing the carbonic acid contained in the air within the tube by means of a strong liquor potassae over a mercury bath, when the proportion of carbonic acid in the atmosphere is indicated by a rise of the mercury within the tube. An electric current is used, by means of the electrode, to explode a given quantity of hydrogen introduced in the tube. The volume of free oxygen in the tube is determined after cooling, and is equal to one-third of the loss of gas in the explosion. It is necessary to use a very thick tube in order to withstand the shock.

EUFAULA (ū-fạ'lá), a city of Barbour County, Alabama, on the Chattahoochee River, eighty miles southeast of Montgomery. It is on the Central of Georgia Railroad. The chief buildings include the high school and the Union Female College. The surrounding country is agricultural and fruit growing. It has manufactures of cotton goods, vehicles, canned fruit, lumber, and tobacco. The municipality owns and operates the waterworks. Population, 1900, 4,532; in 1910, 4,259.

EUGENE (ū-gēn'), a city of Oregon, county seat of Lane County, 125 miles south of Portland. It is finely situated on the Willamette River and the Southern Pacific Railroad, and is surrounded by a fertile farming and fruit-growing country. The Willamette River furnishes excellent water power for manufacturing purposes. Among the manufactures are leather, lumber, furniture, brick, and flour. It is the seat of the University of Oregon and has a number of fine public schools and churches. Electric lights and waterworks are among the public utilities. The first settlement in its vicinity was made in 1854 and it was incorporated in 1864. Population, 1900, 3,236; in 1910, 9,009.

EUGÈNE, François, Prince Eugène of Savoy, noted general, born in Paris, France, Oct. 18, 1663; died in Vienna, Austria, April 21, 1736. Being the son of Eugène Maurice, he was intended for the church, but renounced his country on account of the banishment of his mother by Louis XIV., and entered the service of Emperor Leopold of Austria as a volunteer in the army sent against the Turks. His distinguished service caused his rapid promotion, and in 1693 he was made field marshal. Four years later he defeated the Turks in the Battle of Zenta, by which their power in Hungary was broken. When the Spanish War of Succession broke out, in 1701, he took a command in the army of Italy, but did not achieve much success on account of his force being too small. Shortly after he entered the imperial army of Germany and, in conjunction with Marlborough, in 1703, defeated the French. These commanders defeated the combined army of the French and Bavarians under Marshal Tallard at Blenheim on Aug. 13, 1704. He forced the French to raise the siege of Turin, Italy, the

following year, and soon after expelled their forces from Italy. In 1708 he attained much success on the field of Oudenarde against the French, and again at Malplaquet in 1709, though at the latter place he was dangerously wounded. After the recall of Marlborough, the activities of Eugène were somewhat limited, only to break out anew in 1716, when he defeated a Turkish army of 150,000 at Peterwardein with a force of 64,000 men, and in 1717 stormed Belgrade, gaining a decisive victory. After peace was declared, he served with distinction in the cabinet of Austria, attaining as much success in the deliberations of peace as in the activities of war. The popular songs of Austria long did honor to him and his posterity. History accords him a place among the greatest military heroes of modern times.

EUGÈNIE (ē-zhå-nē'), **Marie de Montijo,** Empress of France, born in Granada, Spain, May 5, 1826. She descended from Spanish and Scotch parents, was educated in Spain, France, and England, and attained to numerous accomplishments. Louis Napoleon, afterward Napoleon III., first met her in London, when he was there in exile. She went to Paris in 1851 and attracted the attention of the leading families, and on Jan. 30, 1853, married Napoleon. The wedding presents bestowed upon the contracting parties were exceedingly valuable. She expended $12,000 presented to her by the city of Paris for the purpose of endowing a college for women and used $20,000 of the amount given her husband for charitable purposes.



EMPRESS EUGÈNIE.

Eugènie, as the Empress of France, became a leader of fashion, maintained a brilliant court, and by taking an interest in politics endeavored to aid in furthering Napoleon's Mexican and papal policy. When Napoleon was in Italy, in 1859, she acted as regent. She was regent during his tour to Algeria in 1865 and again when he was at the head of the army in 1870. She fled to England as soon as intelligence of the surrender at Sedan reached her, and was joined there by her son and husband. Her abode in England was first at Chiselhurst, but later at Farmborough. Three years after removing to England Napoleon died, and her only son, the prince imperial, born March 16, 1856, was killed in the Zulu War in South Africa in 1879. He had received a military education in England and served as a volunteer in the English army, his death causing great sadness to his mother.

EULENSPIEGEL (oi'len-spē'g'l), **Till,** the name of a popular German story-writer, born near Lübeck in the latter part of the 13th century and reputed buried at Mölln in 1350. The book called "Eulenspiegel," meaning Owl's Mirror, so named in his honor, purports to contain his numerous whimsical stories and is the most popular chapbook of Europe. In it the love of fun is mingled with a profound love of mischief. It was originally written in Low German, but was soon after translated into High German and many other languages.

EULER (oi'lēr), **Leonhard,** mathematician, born at Basel, Switzerland, April 15, 1707; died Sept. 7, 1783. He studied at the University of Basel, where he graduated in 1723, and subsequently took up the study of theology and medicine. In 1733 he became professor of an academy in Saint Petersburg, and seven years later was called to Berlin by Frederick II. as professor of mathematics in the Academy of Sciences. He returned to Saint Petersburg in 1766, where he remained a potent factor in educational work until his death. His more important work consists of improving the integral calculus and science of mechanics. Many of his writings have been translated, especially his treatises on scientific and mathematical subjects. Among his books are "Treatise on Naval Science," "Letters to a German Princess," "Treatise on Dioptrics," "Theory of the Moon's Motion," and "The Science of Motion Analytically Explained."

EUPHRATES (û-frā'tēz), an important river of Western Asia, rising by two head streams in the Anti-Taurus range, in Armenia. The western branch, known as Kara-su, rises about 25 miles northeast of Erzerum and joins the Murad Chai, the eastern branch, some distance to the southwest of that city. The great river is joined by the Tigris at Kurna, and the united streams take the name of Shat-el-Arab for the remaining distance to the Persian Gulf, into which its waters flow. The total length of the Euphrates is 1,740 miles, and the area of its basin is 260,000 square miles. It is navigable about 1,200 miles, though the larger warships cannot safely ascend farther than 125 miles, owing to rapids and shallows. During May and June vast floods are caused by the melting snows on the Taurus and the Anti-Taurus ranges, causing the current to rise in velocity from three to five miles an hour and often occasioning great floods. The Bible mentions the Euphrates as one of the four rivers of the Garden of Eden, in Gen. ii., 14. In the prosperity of Babylon extensive canals served in irrigating the flood lands. Nebuchadnezzar connected that city by canals with the interior, and converted the flood lands into the most productive district of the ancient world.

EURASIA (û-rā'shĭ-à), the region included

in the two continents of Europe and Asia. The term *Eur-Asiatic* is frequently applied to the geological formations of the two continents. In like manner, *Eurasian* has reference to both Europe and Asia, as the Eurasian plain.

EURASIANS (û-rā′shạns), the name applied to the people of India who descended from Hindu and European parents. They are the result of inter-marriages, and are usually educated in the manner of Europeans. Though they speak English quite well, their pronunciation is not clear and concise. Young men of this class engage in mercantile pursuits or enter the government service, and many of the girls marry British officers. The Eurasians have a much darker complexion than the Europeans.

EURE (ĕr), a river of France, rises in the department of Orne, and flows into the Seine after a course of 115 miles. It receives the inflow from the Iton, its principal tributary, and is navigable about 50 miles.

EUREKA (û-rē′kà), the exclamation of Archimedes when he discovered a method of detecting the exact amount of alloy in the crown of King Hiero, the meaning being "I have found it." The word is now used to signify an expression of triumph at the time of making a discovery.

EUREKA, county seat of Humboldt County, California, on Humboldt Bay, 225 miles north of San Francisco. It has a good harbor and is a shipping point for lumber and produce. The noteworthy buildings include the county courthouse, the Carnegie library, the high school, and several churches. Sequoia Park is a fine public resort and contains a tract of redwood forest in its virgin state. Among the manufactures are dairy products, lumber products, woolen goods, and machinery. It has a large export trade in wool, lumber, fruits, butter, and fish. The surrounding country is lumbering, mining, and agricultural. It was settled in 1850 and incorporated in 1856. Population, 1910, 11,845.

EUREKA, a city of Utah, in Juab County, 65 miles south of Salt Lake City, on the Rio Grande Western and the San Pedro, Los Angeles and Salt Lake railroads. It is surrounded by a productive gold, silver, and lead mining district. Near the city is a canyon of the Oquirrh Mountains, which is noted for its valuable silver mines. It has several fine schools and a considerable trade. Population, 1900, 3,085; in 1910, 3,416.

EURIPIDES (û-rĭp′ĭ-dēz), noted Greek poet, born in the island of Salamis, in 480 B. C.; died in Macedon in 406 B. C. He secured an elementary education, was trained in gymnastic exercises and rhetoric under Prodicus and philosophy under Anaxagoras, and formed a close friendship with Socrates. Writers credit him with completing his first play at eighteen, though the first publication, "The Daughters of Peleus," appeared in 455 B. C. The first prize was awarded to him in 441 B. C. and the last exhibit made was the "Oretes," in 408. Of the three great Greek tragedians he is the latest and by some is thought the most successful, the other two being Sophocles and Aeschylus. Socrates held his tragedies in high esteem and visited the theater at every performance of a play written by him, though Aristophanes did not admire him, owing largely to his opposition to introducing practical life into tragedy. He went from Athens to Macedon, where he joined the court of King Archelaus, and remained there until his death. When information of his demise reached Athens, there was mourning in the entire city. The actors on the stage of Sophocles wore mourning and the Athenians asked that his body might be buried in their city, though this request was refused by the Macedonian king. However, the Athenians built a tomb in his honor on the road to the Piraeus and inscribed it with "All Greece is the monument of Euripides: Macedonian earth covers but his bones." A splendid monument was erected to him by Archelaus in Pella bearing the inscription, "Never, O Euripides, will thy memory be forgotten."

The entire productions of Euripides, according to some writers, included 75, while others accord him 92. His knowledge of human nature, mastery of tragic situations, and skillful grouping of characters have led to a popular praise of his tragedies. They were the favorites of Aristotle, Ovid, Virgil, Horace, Milton, and Browning. Nineteen of his writings are extant, as follows: "Rhesus," "Alcestis," "Medea," "Hippolytus," "Hecuba," "Heracleidae," "Supplicex," "Ion," "Hercules Furens," "Andromache," "Troades," "Electra," "Helena," "Iphigeneia in Tauris," "Orestes Phoenissae," "Bacchae," "Iphigeneia in Aulis," and "Cyclops." Most writers regard the "Rhesus" as spurious, hence the authentic writings now extant number only eighteen.

EUROPA (û-rō′pà), in mythology, a daughter of Agenor, King of Phoenicia, and the sister of Cadmus and Phoenix. It is related that she gained the love of Jupiter, who assumed the form of a bull and carried her to the shores of Crete, where he took on a human form and married her. She became the mother of Minos, Sarpedon, and Rhadamanthus.

EUROPE (ū′rŭp), a grand division lying north of Africa and west of Asia, and with the latter forming Eurasia. From the standpoint both of history and politics it is the most important of the grand divisions. It is the most densely populated, but is smaller than any of the others, except Australia. The northern boundary is formed by the Arctic Ocean; eastern by the Ural Mountains, the Ural River, and the Caspian Sea; southern by the Black Sea and the Mediterranean; and the western by the Atlantic Ocean. The extreme northern point is Cape North; eastern, a point in Russia lying about 65° east of Greenwich; southern, Punta da Tarifa, in the Strait of Gibraltar; and



PHYSICAL MAP OF EUROPE.

western, Capt Finisterre, in the Iberian Peninsula. Its greatest length from north to south, between Capt Matapan and Cape North, is 2,400 miles, and the greatest distance from east to west is 3,400 miles; that is, measured from Capt Saint Vincent on the west to Ekaterinburg on the east. The total area is 3,782,000 square miles.

The coast line is characterized by a large number of indentations, hence it has a more irregular and extended coast in proportion to its size than any of the other grand divisions. Including the more important indentations, the coast line is about 25,000 miles, but it is nearly double that length if all of the indentations are followed. Many islands lie off its southern and western coasts. The former, which are the more important, include Ireland, Iceland, the British Isles, and the Faro Islands. South of Europe are Corsica, Sicily, Sardinia, Crete, Malta, the Ionian Islands, and the Balearic Islands. Numerous seas and inland waters abound near all of its coast line. These include Cheskaya Bay, the White Sea, the North Sea, and the Baltic Sea on the north; the Caspian Sea, the Black Sea, the Adriatic Sea, the Aegean Sea, and the Mediterranean on the south; while the expansive Bay of Biscay is on the west. The Mediterranean and other seas have arms extending far inland, such as the Sea of Azov, the Gulf of Genoa, the Gulf of Finland, and the Gulf of Bothnia. No lakes occur in the eastern part of Europe, and those of considerable extent are in the northern portion. These include Onega and Ladoga, in Russia, and Vener, Vetter, and Mälar, in Sweden.

Surface. The surface of Europe is characterized by a great plain extending from the Black Sea to the White Sea, and occupying the interior from the mountains in the south and west to the Asiatic boundary on the east. Its mountains form several complicated groups belonging to different geological ages, and occupy largely the southern and western portions. The most prominent system extends in a curved line from the Strait of Gibraltar along the Mediterranean to Asia Minor, and continues as the Caucasus Mountains between the Black Sea and the Caspian. This system is highest in the center, where the Alps attain a general elevation of about 12,000 feet, though Mont Blanc is 15,787 feet above sea level and forms the highest peak in Europe. However, Jungfrau, Matterhorn, and Monte Rose are but little inferior in height. Communication between the north and the south through these mountains is made possible by a number of famous railway tunnels, which include the Simplon, Mount Cenis, and Saint Gothard tunnels.

Several ranges extend from the central group, among them the Cevennes and adjoining ranges in France and the Cantabrian and Pyrenees in Spain, the latter containing peaks over 11,000 feet high. The system extends eastward in two curves to the Black Sea by the Transylvanian and Carpathian, which trend north of the Balkans and Dinaric Alps. North of the Alps are the ranges lying between the valleys of the Upper Danube and the Oder, and the different chains extending through Austria-Hungary. The mountains in the Scandinavian peninsula extend from the southern point of Norway to the Arctic Ocean, a distance of about 900 miles, the highest summit being about 8,000 feet. These ranges include the Kjölen and several broad plateaus that descend abruptly into numerous deep-cut valleys called *fiords*, and which are penetrated by the sea almost to the heart of the plateaus. The Ural Mountains extend along the boundary between Europe and Asia, in the north, and some distance to the west of the boundary in the center, trending on a line almost parallel to the meridians, and terminate in a plain north of the Caspian Sea.

Rivers. Most of the rivers flow in a southeasterly direction, and have their source either in the great central plain or in the mountains of the central west. The four largest rivers rising in the Alps are the Danube, Rhine, Po, and Rhone. Of these the Po flows into the Adriatic; the Danube, into the Black Sea; the Rhine, into the North Sea; and the Rhone, into the Mediterranean. These four rivers have large deltas. The central plain is drained toward the northwest by the Dwina and Petchora into the Arctic; by the Oder, Vistula, Duna, and Nieman into the Baltic; and by the Rhine, Weser, and Elbe into the North Sea. Toward the south and east it is drained by the Dnieper, Don, and Dniester into the Black Sea and the Sea of Azov, and by the Ural and Volga into the inland basin of the Caspian. Numerous rivers are found in all the peninsulas, the most important of these being the Tagus, Douro, and Gaudiana in Spain and Portugal; the Po in Italy; the Loire, Seine, and Garonne in France; the Ebro and Guadalquivir in Spain; and the Glommen in the Scandinavian peninsula.

In the northern part of Europe the lakes are frozen the greater part of the year, especially lakes Onega and Ladoga, in Russia, and Stor Lake, in Sweden, but the lakes of the south, though small, are important for their fisheries and as a basis for inland commerce. The most important of these are located near the Alps. Those south of the Alps include lakes Iseo, Como, Maggiore, Garda, and Lugano; those on the north include lakes Thun, Geneva, Zurich, Lucerne, Neuchâtel, and Constance.

Climate. The climate of Europe is peculiarly genial, though it is marked by periods of extreme cold in the north. The shores are exposed to the warm winds and warm oceanic currents from the southwest, by which the temperature is moderated and rendered favorable to the development of plant and animal life. As we proceed east the extremes of temperature



(Opp. 948)

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become greater, the summer being hotter and the winter having greater cold. The most favorable effects of the oceanic currents are those experienced on the British Isles and the Scandinavian peninsula, in fact these otherwise would be almost uninhabitable. Northern Russia and the extreme north of the Scandinavian peninsula lie partly within the Arctic zone, and correspond in temperature to the extreme northern parts of North America.

As a whole, the climate of Europe is less severe in the western than in the eastern part, since the mean temperature is not perceptibly affected by the sea in the interior. At Sartov, in eastern Russia, the mean temperature is 41°; at Warsaw, 45°; at Berlin, 48°; and at Greenwich 49°. All parts of the grand division have an abundance of rainfall, but in some places it does not occur at the time of the growing season. This is true of Spain, where irrigation is resorted to in agriculture. However, rainfall is most abundant on the western coast and decreases toward the east in proportion of the increase of distance from the Atlantic.

MINERALS. Europe is rich in the useful minerals and many of these have been worked from times immemorial. Carboniferous coal deposits are abundant between the parallels of 40° and 60° north. They are worked with a high degree of efficiency in Great Britain, Germany, France, Belgium, and Austria-Hungary. Iron ore is found in the same or adjoining fields. The output of iron is especially important in Spain, Germany, and Great Britain. Sweden has large deposits of superior steel-making ores, hence the products of this country are shipped very extensively. Nearly all of the world's supply of platinum is obtained from Russia, while sulphur is secured in large quantities from Sicily and Italy. In the production of gold in the world, Russia takes fourth rank, while Germany ranks fourth in the output of silver, and Spain and Portugal are exceeded only by the United States in the production of copper. Fine grades of marble are obtained in Italy, and granite, limestone, and other building materials are abundant in widely separated regions. Other mineral products obtained largely include petroleum, tin, quicksilver, and lead.

VEGETATION. The great range of temperature makes Europe suitable for many species of plants. In the north, which extends beyond the Arctic Circle, the continent assumes the aspect of the tundra, where vegetation is very scant or entirely absent. Here thrive the saxifrage, crowfoot, poppy, scurvy-grass, and other forms common to the Arctic region. Forests of considerable value extend almost to Cape North, where the birch predominates, and farther south are fine forests of fir. The northern part of Russia and the Scandinavian peninsula do not yield cereals, but barley can be grown as far north as 70° north latitude and wheat thrives at about 60°. As we proceed south from this locality, we come in contact with fine forests of oak and beech and enter sections where all classes of cereals thrive.

Rye is grown extensively in many parts of Europe, while maize, oats, and barley yield abundantly. Rice is cultivated in some parts of Spain and Italy. Much attention is given to the culture of the mulberry in the vicinity of the Mediterranean. Many varieties of fruits thrive in the southern portion, such as lemons, oranges, vines, olives, almonds, and peaches, while the hardier varieties are cultivated extensively far into the north. The steppes of Russia are very similar to the great prairies of North America and extend as treeless plains from the borders of Holland to the Ural Mountains. They are especially rich in grasses and have been converted into a productive field for agriculture.

ANIMALS. Formerly the continent was peculiarly rich in wild animal life, but it is now quite rare, except in the northern part and in regions under government protection. Polar bears and reindeer are numerous in the north, while wolves, foxes, bears, and lynxes infest the forests and mountains. Other species more or less widely distributed include the roebuck, ibex, porcupine, stag, and fallow deer. The fisheries are valuable, especially those bearing the cod, anchovy, salmon, mackerel, herring, and tunny. Much interest is vested in the rearing of domestic animals, hence the grades are superior from careful breeding. They are very similar in all sections of the grand division, except in the extreme north, where dogs and reindeer are used as animals of draft.

INHABITANTS. The people of Europe belong to various races and are greatly intermingled in



GERMANIC. ROMANIC.

most of the states. At an early period the Celts occupied the region from the Alps to the British Isles, but they were driven westward by successive waves of migration under the Roman conquests and the insurrections of the Germanic tribes until they were pressed largely to the extreme west, or were assimilated by the most powerful divisions of the Germanic people. The Celtic language is represented at present only by the Gaelic in the islands of Scotland, the Irish in portions of Ireland, the Cymric in Wales, and the Armorican in Brit

tany. Next eastward we find the Teutonic races, comprising the Germanic and Scandinavian divisions. In the former the Germans, Dutch, and English are included, while the latter comprise the Danes, Norwegians, and Swedes. Farther east the Slavonians are mixed with the Teutons to a greater or less extent. The different branches comprise the Russians, Poles, Bohemians, Czechs, Servians, Croatians, and other minor branches. The Greek and Latin people occupy the south and southwestern parts of Europe. Among the Latin, or Roman, races are the French, Spanish, Portuguese, and Italians. All the peoples named above are of the Aryan or Indo-European family.

The Mongolian race is represented in Europe by the Turks, Magyars, Lapps, and Finns, all these having emigrated into Europe within comparatively recent times and secured a foothold by successive conquests or friendly terms of settlement. Another class comprises the Basques, who are thought to belong to the Turanians. Owing to the great mixture of the population it is difficult to classify them on a racial basis; the better way is, perhaps, to base the classification upon languages. By this test it is found that the Teutonic language is spoken by 125,000,000; the Slavonian, by 110,000,000; the Roman, by 114,000,000; the Letts and Lithuanian, by 3,000,000; Armenian, by 1,150,000; Greek and Albanian, by 5,450,000; Celtic, by 3,600,000; and the non-Aryan, by about 18,000,000. Each of the languages has numerous dialects, though the number of distinct forms of tongues is about fifty.

The Christian religion prevails almost exclusively, the only exceptions being the Jewish in widely distributed but minor communities and the Mohammedan in Turkey. In the western part of the grand division various sects of the Protestant and Roman Catholic religion prevail, while the Greek Catholic is the predominating religion of Greece and Russia. Europe holds an important place in the field of education, but the advancement in educational lines has its greatest development in the Protestant nations of the western part, especially in Germany, England, and the Scandinavian Peninsula, where illiteracy has been reduced to a minimum. However, great universities are maintained in France, Austria-Hungary, Italy, and Russia, and the educational uplift in all the countries is marked.

Political Divisions. The countries of Europe as at present organized are governed wholly as independent states, and all of the more powerful nations have extended their political influence by the acquisition and control of territory in other grand divisions. All of them are monarchies, except Andorra, France, and Switzerland, which have republican governments. The alphabetical list of European states is Albania, Andorra, Austria-Hungary, Belgium, Bulgaria, Denmark, France, Germany, Great Britain, Greece, Italy, Liechtenstein, Luxemburg, Monaco, Montenegro, Norway, Portugal, Rumania, Russia, Servia, Spain, Sweden, Switzerland, The Netherlands, and Turkey.

History. According to some writers, Europe was named from Europa, a mythical person of Greece, who was carried off by Jupiter, though other authorities attribute its origin to the Phoenician traders, who applied it to the land of sunset, from the word *Erebh,* meaning darkness.

It is quite certain that Europe was first peopled by successive waves of migration that moved westward from Asia, each pressing the weaker farther and farther westward toward the Atlantic Ocean. The date of these great movements is unknown, though their occurrence is evidenced clearly by the present and past settlements in the European countries. Writers generally agree that authentic history dates in Greece from about 776 B. C. All the earlier periods are estimated from circumstantial evidence. The most successful epoch of Greece is assigned to about 430 B. C., and this date marks approximately the time when all colonies pressed westward. Grecian education moved westward to Rome and made it the predominating influence for many centuries. Greece was conquered by Rome in 146 A. D., and the latter soon made itself master of Spain, Gaul, Helvetia, Illyria, Dacia, and portions of Germany and Brittany. Roman extension carried superior laws, greater industrial activities, and social advancement to the regions conquered, and by its theory of government provided favorable conditions for the spread of Christianity. The northern nations migrated extensively shortly after the Roman Empire began to decline, and paved the way for great commercial and educational activities in the northwest. These movements were accompanied by the settlement of the Anglo-Saxons in England, the Franks in France, the Lombards and Ostrogoths in Italy, and the Visigoths in Spain, who by superior arts rendered the original inhabitants subject to their institutions or became assimilated with them.

A great Germanic empire was established under Charlemagne in 771. After the decline of the Holy Roman Empire, as the German nation came to be called, the territory was organized into the kingdoms of Germany, France, Burgundy, Italy, Lorraine, and Navarre. These movements were followed shortly by the populations of Eastern Europe establishing themselves in regions now more or less influenced by their occupation. The most prominent movements among them were directed toward establishing kingdoms in the north of Germany, Bohemia, Russia, and Poland, while the Magyars invaded Hungary and the Normans established principalities and governments in France, England, and various regions of the southeast.

The Christian Crusades, organized to rescue



GENERAL JOFFRE,
General of the French Army.



GENERAL HAIG,
the English Commander.



GENERAL VON HINDENBURG,
the German Commander.



GENERAL VON DANKL,
the Austro-Hungarian Commander.



ENVER PASHA,
the Turkish Minister of War.



GENERAL PETAIN,
the French Commander.

(Opp. 950.)



KING GEORGE V.

George V., King of Great Britain and Ireland and Emperor of India, succeeded to the throne on the death of his father, the late King Edward VII., in May, 1910. He was then in the forty-fifth year of his age. His wife, Queen Victoria Mary, is a daughter of the Duke of Teck.



EMPEROR WILHELM II.

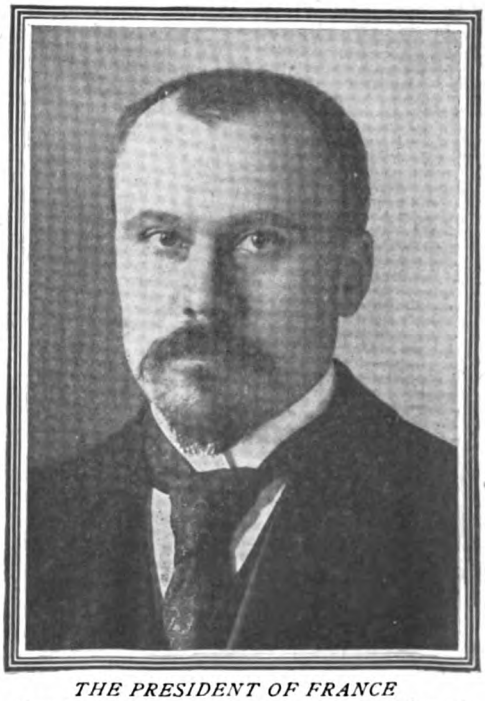
Wilhelm II., Emperor of Germany and King of Prussia, succeeded to the imperial throne June 15, 1888, on the death of his father, Emperor Friedrich III. He was then 29 years of age. His wife, Empress Auguste Victoria, was a princess of the house of Schleswig-Holstein.



KING ALBERT I.

Albert I., the third king of Belgium, ascended the throne on the death of his uncle, King Leopold II., December 17, 1909. He is of democratic disposition, and stands first among European monarchs as a financier.

(Opp. 950)



THE PRESIDENT OF FRANCE

Raymond Poincare in 1909 was made a member of the French Academy, and was French Premier from 1911 until, in 1913, he was elected to succeed Clément Armand Fallières as President of the Republic of France.

Jerusalem from the Mohammedans, exercised a wide influence on the habits and learning of the western peoples, while the Turkish conquest of Constantinople, in 1453, distributed the Greek teachers and philosophers throughout Western Europe. This caused a great impetus in the revival of learning, led to the invention of printing, and ultimately resulted in the Reformation. Spain became the most powerful nation shortly after the discovery of America. France soon after rose to a high plane of influence and the territories of Prussia and Russia were greatly enlarged and the sphere of their power was widened. A vast emigration to America greatly affected all the countries that had become over-populated and was the indirect cause of several extended wars. These conflicts were followed by the French Revolution, the Napoleonic wars, the dissolution of the German Empire, and the colonial development of several nations.

Among the more recent events in European history may be enumerated the independence of Greece; the absorption of Poland by several states; the unification of Italy; the consolidation of Germany into an empire; the establishment of the French Republic, as a result of the Franco-German War; the curtailing of Turkish influence by the independence of Bulgaria, Rumania, Servia, and Montenegro; and the War of 1897 between Greece and Turkey. The dissolution of the union between Sweden and Norway (1905) restored the independence of Norway. As a result of the Balkan War, in 1912-1913, Turkey lost much territory, Greece and the Balkan States were enlarged, and Albania became a kingdom. In 1914 Europe was thrown into the greatest war of history. See **War.**

EURYDICE (û-rĭd'ĭ-sē), in mythology, the wife of Orpheus. She died from the bite of a snake and was followed by her husband to the lower world, where he charmed Pluto by his lyre so her release was obtained. However, Eurydice vanished just as she reached the exit, for the reason that her husband broke the condition of not looking back after her.

EUSEBIUS (û-sē'bĭ-ŭs), **Pamphili,** church historian, born in Palestine, Asia, about 260; died about 340 A. D. He became Bishop of Caesarea about 314 and was a member of the Council of Nice. Constantine the Great, his personal friend, chose him to open this council by an oration, in which he advised moderation and peace. He favored reinstating Arius and at the Council of Tyre joined in censuring Athanasius. His writings are valuable for the light they throw upon the history of the early period of Christianity. They include "Life of Constantine the Great," "Gospel Preparation," and "Ecclesiastical History from the Christian Era to 324 A. D."

EUSTACHIO (å-o͝os-tä'kĕ-ô), **Bartolommeo,** anatomist, born in Italy the early part of the 16th century; died in 1574. His birthplace and early history are uncertain, but it is known that he became a professor of medicine at Rome in 1562. He did much to advance knowledge in anatomy by discovering the Eustachian tube of the ear, which was named after him. He likewise added much to knowledge by describing the structure of the kidneys and the evolution of the teeth.

EUSTACHIAN TUBE (û-stā'kĭ-ạn), in anatomy, the canal extending from the pharynx to the middle ear. Its function is to equalize the pressure of the air on either side of the tympanic membrane. In birds, reptiles, and mammals it is closely connected with the auditory organs. Diseases of the Eustachian tube impair the hearing.

EUSTIS (ūs'tĭs), **James Biddle,** soldier and statesman, born in New Orleans, La., Aug. 27, 1834; died Sept. 9, 1899. He descended from a Creole family, received a classical education, and graduated at Harvard Law School in 1854. Subsequently he practiced law in New Orleans, but at the outbreak of the Civil War entered the Confederate service as judge advocate of the staff of General Magruder and was transferred to the staff of General Johnston in 1862, with whom he remained until the war closed. Soon after he resumed the law practice, was elected to the Lower House of the Louisiana Legislature in 1872, and served in the State Senate in 1874-78. He was elected to the United States Senate as a Democrat in 1876, but resigned three years later to accept the chair of civil law in the University of Louisiana and was reëlected to the Senate, where he served from 1885 to 1891. President Cleveland appointed him ambassador to France in 1893, in which capacity he served with dignity and activity for four years. While residing in Paris he translated Guizot's "General History of the Civilization of Europe" from the French.

EUTAW SPRINGS (ū'tạ), **Battle of,** an engagement of the American Revolution, fought about sixty miles northwest of Charleston, S. C., on Sept. 8, 1781. General Greene commanded the American forces of 2,000 men, while the British under General Stuart numbered 2,300. The former made an attack at four o'clock in the morning and were victorious, but the British rallied and held their position until night, when they withdrew to Charleston. The Americans lost 554 and the British lost about 800. Though a tactical defeat for the Americans, it proved a strategic victory in that the British were shut up in Charleston.

EUTERPE (eu-ter'pe), in mythology, one of the nine Muses, the inspirer of delight. She presided over lyric poetry and played on the flute, of which she was the inventor. In sculpture she is usually represented as a virgin crowned with flowers, holding a flute or some other musical instrument in her hand.

EVANGELICAL ALLIANCE (ē-văn-jĕl'ĭ-kạl ăl-lī'ạns), an association of Christians of

various denominations. The first effort to form such an organization was made at London, England, in 1846, when a meeting was held by representatives of a large number of Protestant churches. About 800 persons were in attendance, representing the Baptists, Lutherans, Methodists, Presbyterians, Episcopalians, Moravians, and a number of other denominations. Among the countries represented were England, France, Germany, Ireland, Switzerland, and the United States. A branch was organized in America in 1867, and this is well represented in Canada and the United States. General conferences in the form of Protestant ecumenical councils represent officially the whole Alliance, but influence is exercised only to promote moral and spiritual lines of action. The purpose is to unify the Protestant missionary work, to coöperate along lines of Christian work without interference of denominational barriers, and to extend religious liberty in all parts of the world. This association has accomplished much good in obtaining reform and greater religious liberty in Japan, Russia, and Turkey.

EVANGELICAL ASSOCIATION (ăs-sō-sĭ-ā′shŭn), a religious denomination founded by Jacob Albright in Pennsylvania in 1807. He was a member of the Methodist Episcopal Church and traveled as an evangelist in the large German settlements of his native State, and carried on a line of effective work in promoting a higher religious life. The book of discipline does not differ in essential points from that of the Methodist Episcopal Church, which it resembles in polity, government, and methods of worship. In 1891 a division was made on account of a difference of opinion in regard to church government, which resulted in organizing the United Evangelical Church. This branch has about 40,000 members and the Evangelical Association proper has 115,000 communicants. The latter is represented by organizations in Canada, the United States, Germany, Japan, and Switzerland. Originally the members were exclusively German or of German descent, but now a large membership is English-speaking. Many charitable, missionary, and educational societies are maintained. The Young People's Alliance is an auxiliary organization.

EVANS, Oliver, inventor, born in Newport, Del., in 1755; died April 21, 1819. He invented the first steam road carriage ever worked in America, the high-pressure steam engine, and the automatic flour mill. In 1797 he wrote "Miller and Millwright's Guide" and "The Young Engineer's Guide."

EVANS, Robley Dunglison, United States naval officer, born in Floyd County, Virginia, Aug. 18, 1846; died Jan. 3, 1912. He served in the Civil War, was promoted to a captaincy in the navy in 1893, and the following year secured command of the cruiser *New York* and soon after of the battleship *Indiana*. In March, 1898, he was placed in charge of the battleship *Iowa*, which command he held during the Spanish-American War, and distinguished himself by taking a prominent part in the battle fought off Santiago, July 3, 1898. He was made rear admiral in 1901 and retired from the service in 1908. He published "A Sailor's Log."

EVANSTON (ĕv′ạnz-tŭn) a city of Illinois, in Cook County, about twelve miles north of Chicago, with which it is connected by surface and elevated electric street railways. It is on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railroads. The site is on a beautiful plat of ground on the margin of Lake Michigan. It is the seat of the Northwestern University, the Norwegian-Danish Theological School, the Garrett Biblical Institute, and the Visitation Academy. The streets are finely paved and lighted by electricity. Evanston was the home of Frances Willard. It was settled in 1835 and incorporated in 1890. Population, 1900, 19,259; in 1910, 24,978.

EVANSTON, a city of Wyoming, county seat of Uinta County, in the southwestern part of the State. It is located on the Bear River and the Union Pacific Railroad, and is surrounded by an agricultural and coal-mining district. The manufactures include flour and machinery. Mineral oil and building stone are obtained in the vicinity. It is the seat of the State institution for the insane and has a number of fine schools. Population, 1910, 2,583.

EVANSVILLE (ĕv′ạnz-vĭl), a city of Indiana, county seat of Vanderburgh County, on the Ohio River, about 160 miles northeast of Saint Louis. It is on the Louisville and Nashville, the Illinois Central, the Southern, and other railroads, and has communication by regular lines of steamboats. Productive coal fields are worked in the vicinity. It has a large shipping trade in coal, timber, brick and tile, flour, pork, grain, and tobacco. Among the manufactories are flouring mills, iron foundries, furniture factories, cotton mills, sawmills, breweries, and machine shops.

Evansville has regularly platted and well-improved streets. Much of the paving is of brick, stone, and asphalt. The chief buildings include the county courthouse, the Federal building, the city hall, and the Willard Library. It has a marine hospital, an insane asylum, and a fine high school. Cooks and Garvin parks are well-kept public resorts. Evansville was founded in 1816 and so named from Gen. Robert M. Evans. It was incorporated in 1847. Population, 1900, 59,007; in 1910, 69,647.

EVAPORATION (ē-văp-ō-rā′shŭn), the conversion of a liquid or solid by heat into vapor. Some solids, such as arsenic and camphor, pass into a state of vapor and are said to be sublimated. The rapidity at which evaporation proceeds depends upon the extent of surface exposed, for the reason that it takes place at the

surface; the quantity of the same vapor already present in the air, because when the air is saturated no more of the liquid can evaporate; on the removal of the air, because evaporation ceases when the air over the liquid is saturated; on the temperature, because warm air can hold more vapor than cold air; and on the pressure on the surface, since diminished atmospheric pressure increases the rapidity of evaporation. From every water surface and even from masses of ice and snow there is constantly arising, at all temperatures, an invisible vapor. A volatile liquid, when placed in a vacuum, rapidly evaporizes without external heat. If a drop of such liquid be passed into the empty space above the mercury of a thermometer tube, it disappears by changing into vapor. When the vapor more than fills the vacuum, the mercury is depressed, thus showing that it possesses tension. If more liquid be passed into the tube, it reaches a point when no more can be evaporated, but simply floats on the surface of the mercury. The vapor is then at its greatest tension and the space it occupies is said to be saturated.

The pressure remaining the same, there is for every liquid a certain temperature at which it boils. After it boils, all the heat it receives is rendered latent, and it can never be raised above that temperature while its vapor is allowed to escape. When vapor loses heat and condenses, the latent heat again appears as sensible heat. Thus, large buildings are heated by steam being passed through pipes, and, as it condenses, these pipes give out its latent heat. We are cooled by fanning because the warm air, thus brought in contact with the skin, causes a rapid evaporation of the moisture of the skin, thereby lowering the temperature. If water be placed in a vacuum space and the vapor which escapes from it be removed as rapidly as it forms, it is frozen by its own evaporation. Various machines used in manufacturing ice utilize this principle. The moisture taken up by the atmosphere in the form of vapor rises to considerable heights, forms clouds by partial condensation, and descends in rain when the point of saturation is reached.

EVARTS (ĕv'ērts), **William Maxwell,** lawyer and statesman, born in Boston, Mass., Feb. 6, 1818; died Feb. 28, 1901. He graduated at Yale, where he was joined by several others in founding the *Yale Literary Magazine.* Later he studied in the Harvard Law School and was admitted to the bar of New York in 1840. In 1860 he was chairman of the New York delegation in the Republican national convention, served as Attorney-General of the United States in 1868-69, and was counsel in the impeachment trial of President Johnson. He was counsel for the United States before the tribunal of arbitration on the Alabama claims at Geneva, Switzerland, in 1872. In the famous trial of Henry Ward Beecher, which took place in 1874, he was senior counsel, and served as counsel before the electoral commission in behalf of President Hayes. From 1877 to 1881 he served as Secretary of State, was elected Senator from New York for the term of 1885-91, after which David B. Hill succeeded him. Evarts, who ranked among the most eminent lawyers of America, was shown distinguished honors by several educational institutions, and published a number of addresses, among them the centennial oration at Philadelphia, a eulogy on Chief Justice Chase, and addresses delivered at the unveiling of the statues of Seward and Webster and the Bartholdi statue of Liberty.

EVELETH (ĕv'ę-lĕth), a city of Minnesota, in Saint Louis County, seventy miles northwest of Duluth, on the Duluth and Iron Range and the Duluth, Missabe and Northern railroads. It is surrounded by an iron-mining district. The chief buildings include a number of schools and churches. It has a large trade in merchandise and produce, and is important on account of the enterprises connected with the iron industry. Population, 1905, 5,332; in 1910, 7,036.

EVENING SCHOOLS, a class of schools established in many countries, generally in large cities, as a part of the public school system. The purpose is to give to those of school age, who cannot avail themselves of the advantages of the day school, an opportunity to obtain an elementary education and to enable adults, who have finished the course of instruction in the public day school, to acquire additional knowledge, especially on subjects relating to their particular occupation or profession. Schools of this class are now maintained in Austria, France, Germany, Great Britain, Switzerland, and other countries of Europe. In some countries they are supported at the expense of the state and are attended by both sexes, and the purpose is to furnish educational facilities for children employed in factories. Schools for the education of the children belonging to the industrial classes were formerly open on Sunday and evening schools more recently succeeded the Sunday schools, though in some countries the two are combined.

The evening schools of America may be said to date from 1850, when they were made an adjunct to the educational system in many large cities. They have been particularly proficient in teaching the English language to foreigners, and for that purpose many employ teachers who speak the language of the students. However, the main purpose is to teach the common school branches and to give instruction in commercial lines. The Drexel Institute of Philadelphia and Cooper Union of New York City are among the noted institutions that maintain evening classes for general and special instruction. Experience has demonstrated that evening schools constitute an essential part of every common school system, particularly in large communities, in which many children are obliged to leave the

day school before they acquire the rudiments of an education. The office of technical schools, while different, is no less important, since an increase of skilled labor in any community is one of the most valuable elements of its wealth and prosperity.

EVEREST (ĕv'ĕr-ĕst), **Mount,** the highest mountain peak in the world, situated in Nepal, Asia, among the great peaks of the Himalayas. Its height is 29,002 feet above sea level. The name was applied in honor of Sir John Everest (1790-1866), who was surveyor general of India.

EVERETT, a city of Massachusetts, in Middlesex County, in the extreme eastern part of the State. It is on the Boston and Maine Railroad and a number of electric interurban lines. The noteworthy buildings include the Whidden Memorial Hospital, the Parlin and Shute libraries, and the high school. It has systems of sewerage and waterworks, graded and paved streets, and a large trade in produce. The manufactures include bicycles, chemicals, baby carriages, furniture, hardware, and gloves. The surrounding country is agricultural. It was settled in 1643 and became a city in 1892. Population, 1905, 29,111; in 1910, 33,484.

EVERETT, a city of Washington, county seat of Snohomish County, on Puget Sound, about 35 miles north of Seattle. It is on the Northern Pacific, the Great Northern, and other railroads, and has a fine harbor. The customhouse, the public library, the high school, the county courthouse, and the theater are the chief buildings. It has extensive shipyards, railroad shops, flouring mills, machine shops, and smelting mills. The public utilities include electric lights, sewerage, waterworks, and paving. It was settled in 1891 and incorporated in 1893. In recent years it has had a rapid growth in wealth and commerce. Population, 1900, 7,838; in 1910, 24,814.

EVERETT (ĕv'ĕr-ĕt), **Edward,** statesman and author, born in Dorchester, Mass., April 11, 1794; died Jan. 15, 1865. When graduating from Harvard College, he was accorded the highest honors, though only seventeen years of age. While at this institution he was the principal editor of the *Harvard Lyceum,* a college publication founded among the earliest in America. He became pastor of the Brattle Street Church in Boston when nineteen years of age, was appointed professor of Greek language and literature in Harvard, and later took a two years' course at the University of Göttingen, Germany, to prepare himself for the position. However, he resided four years in Europe and formed the acquaintance of many distinguished men, including Byron, Davy, Scott, and Jeffrey. He began his work as professor at Harvard in 1819, where he gave a course of lectures on Greek art and literature that was afterward repeated in Boston to large audiences. In 1820 he became editor of the *North American Review,* and during his editorship he contributed about one hundred excellent articles. He was elected to Congress in 1824, serving in the House for a period of ten years.



EDWARD EVERETT.

From 1835 to 1839 Everett served as Governor of Massachusetts and in 1841 was appointed minister to the court of Saint James. While serving in that capacity he secured several important treaties, among them an agreement by which American seamen obtained the right to fish in the Bay of Fundy. While resident in London he was granted degrees and shown distinguished honors by the universities of Cambridge, Oxford, and Dublin. Soon after returning to America he was elected president of Harvard College, in which capacity he served in 1845-48. On the death of Daniel Webster he became Secretary of State, and was chosen to the Senate of the United States by the Legislature of Massachusetts in 1853. The later years of his life most widely established his reputation and influence throughout America.

The oratorical powers of Everett were revealed in several excellent orations in behalf of peace during the conflict preceding the Civil War, the most noted being one on Washington, which he delivered in many parts of the Union. Applications for lectures came from many quarters, and people everywhere showed an eagerness to hear him. His expenses were wholly borne by himself, though tickets were sold to all auditors, but the funds were contributed toward the purchase of the old home of Washington at Mount Vernon, his contributions in this way amounting to $100,000. In 1860 he was nominated for Vice President on the ticket headed by Bell, though against his wishes. He delivered the address at the dedication of the national cemetery at Gettysburg in 1863. Among his principal works published are "Defense of Christianity," "Orations from 1825 to 1836," and "Orations from 1825 to 1850."

EVERGLADES (ĕv'ĕr-glādz), a tract of swampy land in the southern part of Florida, 150 miles long and 50 miles wide. It includes numerous marshy islets covered with dense thickets and groves of pines and palmettoes. Many shallow streams and lakes characterize the region. Formerly it was infested by vast numbers of alligators. The Everglades were made historical by the Seminole Indian War,

in which the chief, Osceola, took a prominent part against Gen. Andrew Jackson.

EVERGREEN, the trees and shrubs which retain their verdure through all seasons, as the fir, laurel, cedar, holly, cypress, juniper, etc. Evergreens usually shed their leaves in the spring, after their successors have reached a state of development, but in some instances a set of leaves lasts several years. The leaves are generally of thicker and firmer texture than those of deciduous trees, and the undiminished thickness of the foliage, characteristic of the northern scenery both in summer and winter, affords exceptional winter shelter for animals. Evergreens form very popular ornamental shade trees, and their boughs are used on festive occasions for decorative purposes.

EVERLASTING FLOWER, the popular name of various flowering plants, the bloom of which may be kept many years without a material diminution of beauty. They include the amarath, some species of cudweed, and a number of others. See **Immortelles.**

EVIDENCE (ĕv'ĭ-dens), in law, that which tends to prove or disprove any matter in question. It differs from the proofs by which human judgment is ordinarily determined in non-judicial matters, chiefly in certain rules established for the sake of felicity in disposing of complicated questions of fact, or of public policy, when by lapse of time or other causes there would be a deficiency of evidence. The rules under which evidence is admitted differ more or less, though in general they have many points in common, and for convenience are reduced under four heads, as follows: 1. Cases in which evidence is excluded on the ground of being untrustworthy and tending to show by its very nature that it likely is untrue. 2. Cases in which a rule is prescribed for the purpose of getting at a certain conclusion, though arbitrarily, when the subject is intrinsically liable to doubt from the remoteness, discrepancy, or actual defect of proofs. 3. Cases in which a legal presumption is substituted for actual proof, or in place of what could be proved, being supposed to be more consistent with the real rights of the parties than any result which could be expected from positive testimony. 4. The graduation of the weight of evidence, which will be found in some instances to be arbitrary in its origin, and, perhaps, not altogether in accordance with the ordinary process of judgment.

Evidence is usually studied under four heads: oral or documentary, direct or circumstantial, primary or secondary, and prima facie or conclusive. *Oral evidence* consists of statements made under oath by witnesses in court, while *documentary evidence* includes proofs in writing, which are submitted to the court or jury for inspection. *Direct evidence* is proof in itself of the existence of a fact, while *circumstantial evidence* is indirect, tending to show by circumstances that the fact sought to be established has existence. *Primary evidence* proves a fact by the best evidence obtainable, while *secondary evidence* is admissable only when primary evidence cannot be shown. For instance, when a case hinges upon a written contract, the agreement in writing must be produced if possible, but, if it is shown that it cannot be procured as evidence, then its existence may be proven by a copy or by oral testimony. *Prima facie evidence* is such as the law declares, or in fact appears, to be sufficient proof, while *conclusive evidence* establishes a fact and renders inadmissible any evidence to contradict it. While the rules governing evidence are very extensive, the essence of this branch of the law hinges upon what can be proved, rather than what is true.

EVOLUTION (ĕv-ō-lū'shŭn), in biology and geology, the steps by which organic and inorganic matter came to exist in their present forms. It is evident to every inquiring mind that times come when both the infantile and philosophic are led to ponder the question of the origin of things. In attempting to answer man has constructed a cosmogony which seeks to give an account of the origin of the universe. There are three classes of cosmogonies that merit thought. These represent that the world has existed in its present form from eternity; that the matter, but not the form, of the world existed from eternity; and that the matter and form of the world are due to a spiritual cause. The last two are termed evolution and creation, respectively. Evolution seeks to trace the growth of the world and the expansion of life forms from cause to effect, while creation disposes of the whole matter by attributing all laws of the universe, of life and being, to a divine godhead.

The very nature of the universe, with its varied changes through long periods of time, renders philosophies attempting to account for the laws that underlie cause and effect incapable of being grasped by even the highest effort of the intellect, and they are contradicted by various other philosophies and by the evidence of experience. The study of natural sciences has thrown light upon various questions relative to astronomical, geological, and biological phenomena. Through it have been fathomed many questions formerly incomprehensible, but there always remain conditions that point to a first cause which the most powerful intellect cannot comprehend. The theory of evolution involves a hypothesis which precludes a sudden and unexplained bursting forth of worlds and abrupt formations of physical laws to hold them in space, a miraculous springing up of life forms to inhabit and utilize nature's forces, but aims to account for all phenomena by natural laws, as the consequence of positive forces that operate under the will of a creator, or assume forms and undergo changes as the natural result of fitness. As a theory it superseded the crude

anthropomorphisms that did not recognize the growth of the universe as the unfolding of a cosmic drama, as a development under laws that bear scientific scrutiny.

In former times it was held that the universe is permanent and at rest, having neither motion nor sensible change. The static views of ancient astronomers gave way to those of Kepler, Copernicus, Galileo, Herschel, and Newton, by which a conception of the kinetic forces was recognized and the nebular hypothesis was established, which assumes to explain the commencement and motion of the planets and the sun by gradual condensation from a nebulous mist that occupied space. Geology led to a study of the earth's crust and to the belief that our sphere was once a globe of fire, which gradually contracted by cooling and caused the formation of an outer crust. The condensation of atmospheric waters gave rise to the oceans, which finally became confined to definite regions and left large tracts of projecting lands, and after successive ages rivers and mountains were formed.

That life existed during at least a large portion of the time required to form the earth's crust is demonstrated by fossil remains of animals and plants, which abound in many of the aqueous and metamorphic rocks. These rocks bear evidence that the lowest forms of life appeared first, and the higher gradually succeeded them and in many cases caused the disappearance of the earlier forms. The earlier animals were the protozoa, and after them, as if from evolution, came successively the radiates, articulates, mollusks, and finally the vertebrates. The earlier mollusks were followed by fishes, then came reptiles, later amphibious animals, and lastly mammals and man

As a whole the fossil remains indicate that early life forms were general in character and gradually developed into the special; or, in other words, the evolution proceeded from the general to the particular, from the homogeneous to the heterogeneous. The changes were not abrupt, but proceeded gradually, one distinct form existing long periods of time after another had come into life. It is evident that the reptiles succeeded the fishes, though both existed afterward contemporaneously, and the reptiles were succeeded in a similar manner by birds. In this way the different forms of animals passed into each other by slight changes, though these effected very various results after long periods of time. In the process of evolution, rudimentary or useless organs gave way, and later became either entirely lost or existed only as an evidence of the changes that had previously occurred. To illustrate, the fins of a fish were small organs, though afterward they became modified as the wings of a bird, and later the paws of a dog, and still later the arms of a man. In the life forms still existing there are evidences of rudimentary organs, such as teeth rarely found in some birds, and hind legs concealed under the skin in some species of snakes.

All that is true of animal life in the process of evolution is true of plant life. The lower forms which prevailed at first gradually extended into other species and after successive changes multiplied into thousands of forms that exist at present. Besides, it must be borne in mind that there are fully as many extinct forms of plant as of animal life, the extinct species having been crowded out by others more nearly fitted to exist under the changed conditions of climate, and doubtless possessing greater ability to battle for place. In connection with this phenomenon may be mentioned the evolution of mind from the uncultured and crude to the alert, scrutinizing, and moral. In society mind has undergone a long line of evolution, by means of which it has acquired useful arts and has developed a higher life and a more complete civilization.

Among recent writers on the theory of evolution are Huxley, Haeckel, Darwin, and Spencer. Huxley speaks of evolution as the system that "embraces in one stupendous analogy the growth of a solar system from molecular chaos, the shaping of the earth from the nebulous cubhood of its youth, through innumerable changes, and development of a living being from the shapeless mass of protoplasm we term a germ." Spencer attributes all the changes of nature to three agencies—force, matter, and motion—while Haeckel traces both the vegetable and animal kingdoms to one very low form of life, consisting of a cell, and supposes this cell to be produced by or from inorganic matter by spontaneous generation. This he asserts to be possible for the reason that some forms of animal and vegetable life are so nearly similar that it is difficult to classify them. Darwin in his "Origin of Species" intimates his belief that life may have been originally breathed by the Creator into a few forms or into one, and that the others sprang from them in successive stages. See **Darwinism.**

EWALD (ā'vält), **Georg Heinrich August von,** orientalist and theologian, born in Göttingen, Germany, Nov. 16, 1803; died May 4, 1875. After securing a liberal education, he was made instructor in the gymnasium of Wolfenbüttel, and in 1831 became professor of philosophy in the University of Göttingen. While there he incurred the displeasure of the authorities for opposing the King of Hanover, who did not favor the constitution, and was removed in 1837 for expressing liberal political opinions. In 1838 he became professor of philosophy at Tübingen and after three years was appointed instructor of theology, in the teaching of which he came in conflict with the Hegelians, Pietists, and Catholics. He was again chosen professor at Göttingen in 1848, became a member of the North German parliament, and as such gave

active support to Protestant reforms. When Hanover was annexed to Prussia, in 1866, he refused to swear allegiance to the king of that country, for which he was removed from his position. No public man of his time wielded a larger influence as a scholar, and none made a deeper impression upon the thought of his generation. He published many works of vast importance, among them "History of the Jewish People," "Lexicon of the Hebrew Language," "Beginner's Book of Hebrew," "Antiquities of the People of Israel," and "Treatise of Languages."

EWELL (ū'ĕl), **Benjamin Stoddert,** mathematician, born in Washington, D. C., June 10, 1810; died in James City, Va., June 19, 1894. He graduated from West Point at the age of 22 years, and served with distinction as professor of mathematics and philisophy. In 1836 he became professor of Hampden-Sydney College, and later held like positions in Washington College and William and Mary College, accepting the presidency of the latter in 1854. After serving in the Confederate army, he was again elected president of William and Mary College, which position he held until 1888. Later he obtained favorable recognition from Hobart College and the Royal Historical Society of England.

EWELL, Richard Stoddert, Confederate soldier, born in Georgetown, D. C., Feb. 8, 1817; died Jan. 25, 1872. He graduated at West Point, served with distinction in the Mexican War, and later took part in the war against the Apaches in Mexico. At the beginning of the Civil War he resigned his commission as captain and entered the Confederate army, in which he attained to the rank of major general. While serving under Jackson, in 1862, he lost a leg, but after Jackson's death he took command of the second army corps and received the rank of lieutenant general. His services to the Confederate cause were especially valuable at Winchester, Gettysburg, in the Wilderness, and at Spottsylvania Courthouse. Later he was given command of the department of Richmond, and, after being defeated, he was taken prisoner, and his whole command was captured by Sheridan in 1865. His death occurred in Springfield, Tenn., where he settled after the war.

EWING (ū'ing), **Thomas,** statesman, born in Ohio County, Virginia, Dec. 28, 1789; died in Lancaster, Ohio, Oct. 26, 1871. At an early age he was taken to Ohio, where he worked in the Kanawha salt works, and secured a fund sufficient to enable him to graduate from the Ohio University. Later he studied law, was admitted to the bar in 1816, and entered upon a successful practice in the courts of Ohio and the Supreme Court of the United States. He was elected to the United States Senate in 1831, where he served six years, and later was made Secretary of the Treasury in the Cabinet of President Tyler. President Taylor appointed him Secretary of the Interior in 1849, being the first to hold that office after the creation of that department, which position he held until the death of the President. Later he was elected to the United States Senate, where he opposed Clay's compromise bill and the Fugitive Slave Law, and advocated the abolition of slavery in the District of Columbia. His views on national banks were antagonistic to the policy of President Taylor, but in his postal policy he was vigorously supported and was instrumental in securing many improvements in the service. He retired from the Senate in 1851 and resumed the practice of law in Lancaster, where he died twenty years later.

EXCHANGE (ĕks-chānj'), the division of economics which treats of the interchange of articles of value, as in commerce, or the transfer of commodities between different parties. The conditions peculiar to life confine the sphere of human activity largely to a particular place, while human wants are satisfied only by the productions from many different regions. From this localization of the efforts of man and the vast extent of his needs comes the necessity of transportation and trade. To be equitable, the exchange must be mutual and voluntary between two or more parties, and the right of property must exist. These are primary conditions, since transfer without a consideration is a gift, involuntary relinquishment is robbery, and no exchange can be effected unless the parties interested possess a right to the property exchanged.

The general law of exchange requires that value be given for value. In this connection the term *value* is used in a relative sense. It is defined as the estimate of the sacrifice requisite to come in possession of a desired object, and is sometimes spoken of as the *cost of production.* Hence, prices depend upon the *supply* and *demand* of a given article, or the quantity offered for sale on the one hand and the desire to possess on the other. It is understood that the desire must be more than mere longing, and must be attended by ability to purchase.

To promote exchange is one of the prime objects of government. In order to promote commerce and bring about the most beneficent results, legislation must aim to foster international and domestic trade, provide a wholesome monetary system, and regulate banking. It must guard against the evils which are likely to result from the monopolistic control of certain avenues of trade and transportation, as well as the limitation of certain lines of production for the purpose of controlling prices.

The term *exchange* is likewise applied to a class of transactions in commerce by which the debts of persons or corporations located in a distant city or country are canceled by a bill of exchange, as a check or draft, without the actual payment of money. This is effected by the payer depositing specie or its equivalent in

a bank for the purpose of forming a basis whereby the checks or drafts issued can be redeemed. The greatest volume, both of domestic and foreign business, is transacted by this system of exchange.

EXCISE (ĕk-sīz′), a tax levied upon commodities produced at home, as distinguished from customs or duties on imports. It is used generally in Great Britain to describe the system known as internal revenue in the United States. The excise system of England dates from 1643, when the Long Parliament levied duties to support the army against Charles I. After the restoration of the monarchy, it was continued, and subsequently it became widespread and oppressive. Sir Robert Peel headed a movement to repeal a number of the excise tax laws, and many of these duties were reduced or abolished after 1844. Excise taxes are levied in many countries upon beer, wine, tobacco, and cigars, such as are provided for by the laws of France, Germany, and the United States.

The first excise law of the United States was advocated by Alexander Hamilton and was adopted after an excited debate in 1790. It levied a tax ranging from nine to twenty-five cents per gallon upon liquors distilled within the country, and a higher rate was charged on imported liquors, but lower rates were established in 1792. Much opposition finally caused the Whisky Insurrection of Pennsylvania in 1794. The excise was abolished in the administration of Thomas Jefferson, but was revived during the War of 1812, when a tax was imposed on sugar, salt, liquors, carriages, and instruments of exchange. These duties were repealed in 1817 and no excise duty was levied until 1862, during the Civil War. This system was finally merged into the internal revenue, which continues to the present time. At the outbreak of the Spanish-American War, in 1898, the tax on tobacco and liquors was doubled and many proprietary articles were made subject to taxation. Subsequently the excises were reduced and the war tax was discontinued in 1902. See **Tax.**

The excise duties of Canada are levied chiefly on spirits and tobacco, in addition to which the manufacturers of these products pay a nominal license. However, both the duties and the licenses are preferential in favor of those who make the products from commodities produced within the country. The distiller pays a license of $250; the brewer, $50; the manufacturers in bond for exportation, $300; and the manufacturers of cigars and tobacco from Canadian products, $50, and when cigars and tobacco are made from imported leaf tobacco, $75. The tax per proof gallon on spirits is $1.90; on tobacco per pound, $0.05; on cigars made of domestic tobacco per thousand, $3; and on malt per gallon, $0.015.

EXECUTIVE (ĕgz-ĕk′ū-tĭv), the branch of a nation, state, municipal government, or corporation which controls the administrative functions. All free governments recognize three departments—the executive, legislative, and judicial—and no state can long exist without a distribution of its power and functions. The term *executive* is applied to the chief magistrate, whether he is a governor, president, king, or emperor, and extends more or less to the principal officers in all civil institutions. In the United States the chief executive power is vested in the President, who is assisted by a Cabinet which has advisory functions. The President is by the terms of the Constitution made ex-officio commander in chief of the army and navy of the United States and of the militia of the several states, when engaged in the actual service of the nation. The principal officer of each department of the government may be required to furnish to the President an opinion in writing on questions relative to public interest. With the advice and consent of the Senate, the President is empowered to make treaties and nominate certain civil, military, and naval officers of the United States. Besides the duties especially enumerated in the Constitution, it devolves upon the President to control the subordinate departments whose heads are known as Attorney-General, Postmaster-General, and secretaries of State, Treasury, Interior, War, Navy, Agriculture, and Commerce and Labor. The business of the government is carried on through these departments under the direction of the President, statutes are enforced, and special laws passed by Congress are put in operation.

EXETER (ĕks′ē-tēr), a city and river port of Devonshire, England, on the Exe River, about 170 miles southwest of London. The site is on the summit and slopes of a beautiful ridge rising 150 feet from the bank of the river. It is surrounded by an agricultural country and has many industrial enterprises. The modern utilities include steam and electric railways, stone and asphalt paving, and gas and electric lighting. Though dating from the early history of England, it has been outgrown by many newer cities. Among the manufactures are agricultural implements, machinery, clothing, paper, gloves, and Honiton lace. The buildings of interest include Saint Peter's Cathedral, Saint Michael's Church, Albert Memorial Museum, and the remains of the castle of Rougemont. A canal connects the city with the tideway and provides convenient access for ships and steamers. The city was founded before the invasion of the Romans, was captured by the Danes in 876, and was taken by William the Conqueror in 1068. A new theater building burned on Sept. 5, 1887, at which time 190 lives were lost. Population, 1907, 43,368; in 1911, 48,660.

EXETER COLLEGE, an educational institution located at Oxford, England, and formerly

called Stapledon Hall. It was founded by Walter de Stapledon and received its present name at the request of Edmund Stafford, Bishop of Exeter, who added two fellowships. Exeter College is a department or college of Oxford University.

EXETER HALL, an assembly hall with a seating capacity for 5,000 persons, situated on the Strand in London, England. It was completed in 1831 and in 1880 was purchased at $100,000 for the Young Men's Christian Association. Formerly it was used for religious assemblies of various kinds and for musical concerts. At present it is the headquarters of the local Y. M. C. A. and is let for religious assemblies.

EXHIBITION (ĕks-hĭ-bĭsh'ŭn). See **Exposition.**

EXODUS, the second book of the Pentateuch and of the Old Testament. It consists of two distinct parts, which include an account of the deliverance of the Israelites from Egypt and a description of the giving of the law. The book begins with the death of Joseph, recounts the oppression of the Hebrews in Egypt, the birth and call of Moses, the deliverance from Egypt, and the way to Sinai. It includes a description of the tabernacle, the wanderings in the desert, and the establishment of the Covenant with Jehovah. Tradition and evidence affirm the Mosaic authorship of the Book of Exodus, but it is questioned by a number of eminent scholars.

EXOGEN (ĕks'ō-jĕn), or **Dicotyledon,** a plant whose stem increases in thickness by successive additions on the outside of what surrounds the central pith. The structure is best seen in the bodies of trees having a central pith, which is surrounded by as many concentric layers as the tree is old in years, and the whole is inclosed by a cylindrical sheath of bark. Rays called medullary radiate from the central pith to the bark. Exogens have two seed leaves, or cotyledons, and are now generally called *dicotyledons.* The leaves, with a few exceptions, are reticulated, while the flower usually has four or five parts. In all these respects exogens differ from endogens. The greater number of the trees in tropical climates and all of those in cold regions are exogens.

EXPANSION (ĕks-păn'shŭn), in physics, the increase in bulk which a body undergoes in consequence of a change in its temperature, so that it occupies a greater space while the weight remains the same. Heat is the most common cause of expansion. Water in cooling ceases to contract at 39.2° Fahr. and, in lowering its temperature, it expands again until frozen, when the expansion reaches about one-eleventh of its original bulk. Thus water, when at its greatest density, which is at 39.2° Fahr., presents the curious phenomenon of expanding whether heat or cold be applied. Expansion is common to all substances, though gases expand more than liquids, and liquids more than solids. It is due to this force that wagon tires are made somewhat smaller than the wheel. Hence, when heated, they may be slipped on easily, and in cooling contract sufficiently to hold the parts of the wheel securely together. Winds are caused by the air expanding under the heat of the sun, and the phenomenon of oceanic currents is due to the same cause.

EXPLOSIVES (ĕks-plō'sĭvs), the substances which may cause an explosion by their sudden combustion or decomposition. The remarkable fact that explosives will not explode in vacuums was discovered early after gunpowder came into use, though the first definite experiments made in this connection were those of Priestly more than a century ago. These experiments were effected by placing gunpowder in vacuums and heating it by concentrating the sun's rays on it with a lens or burning glass. Some writers have expressed the opinion that the discovery of explosives has been, next to that of printing and the application of steam power, the most valuable. It is true that their utility in the arts of peace is very important, as otherwise the vast engineering enterprises of modern times would have been entirely impossible or required a vast additional expenditure of time and labor.

As a matter of convenience, explosives are classed as explosive mixtures and explosive compounds. *Explosive mixtures* are those that can be separated more or less completely by mechanical means not involving chemical action. In a separate condition the ingredients, as a rule, do not possess explosive properties. *Explosive compounds* are chemical compounds or chemical combinations which possess a definite explosive molecule, and contain both the combustible and the supporter of combustion in a closely united form. Most explosive mixtures require a particular period of time for combustion, while in explosive compounds the action is much more sudden and violent. Among the list of explosives may be classed gunpowder, nitrate mixtures other than gunpowder, chlorate mixtures, compounds containing nitroglycerin, and gun cotton. To these may be added the nitro-substitution compounds, including picric powders, springel explosives, and fulminates. Aside from these are numerous compounds that may be grouped with each of the above classes, all more or less valuable in war, for mining, and for purposes which require the sudden development of a powerful force. Some of the newer explosives that have gone into use are smokeless, or are unaccompanied by a loud report at the time the explosion takes place. The newer list of explosives also includes melinite and trinitrotoluene; the latter is made from totuene and its high explosive force renders it valuable in charging shells. See **Gunpowder.**

EXPOSITION (ĕks-pō-zĭsh'ŭn), a national or international exhibition of the works of art

and industry for the purpose of stimulating public interest, promoting manufactures, and expanding trade. The first great industrial exposition of the world was held at Paris in 1798, and its success caused a similar display of French industries to be made in 1802. The effects of these expositions were so widespread and the results so beneficial that many other European and American nations were induced to organize similar enterprises. Great expositions of more or less importance to the industrial arts were held prior to 1850 at Berlin, Vienna, Saint Petersburg, Brussels, Moscow, Stockholm, Dublin, Lisbon, Madrid, Manchester, Philadelphia, New York, and other great centers of population. Among the noteworthy international expositions held since are several that attracted the attention of practically every civilized nation. The first British exhibition of an international character was held at Crystal Palace, London, in 1851. Soon after, in 1853, the United States made its first general effort in this direction at New York. The first universal French exposition was opened in Paris in the Champs Elysées in 1855 and contained exhibits of about 24,000 different persons and interests. A great international expositon was given in Haarlem, Holland, in 1861. The Belgians opened a similar enterprise at Brussels in the same year, and Great Britain followed with an international exhibition in 1862.

The second international exposition of France opened on the Champ de Mars in 1867. It was followed by the exposition at Philadelphia, Pa., in 1876, to commemorate the centennial of the Declaration of Independence. The main building of the Centennial Exposition alone had a floor space of twenty acres, being 460 feet wide and 1,180 long, while the other buildings were proportionally grand and extensive. France held a third international exposition at Paris in 1878, the area of its site being 140 acres, and in 1889 gave the fourth to commemorate the centenary of the French Revolution. One of the prominent features of this exposition was the famous Eiffel Tower (q. v.). The next great exposition was held at Chicago, Ill., in 1893, being designed to commemorate the 400th anniversary of the discovery of America. In many respects it may be said to have been the most successful and popular display ever made in the Western Hemisphere. However, it was closely rivaled by the Louisiana Purchase Exposition held at Saint Louis, Mo., in 1904, to commemorate the Louisiana Purchase. Both before and since the Chicago exposition numerous national or district expositions have been given, such as the Cotton States Exposition at Atlanta, Ga., the Trans-Mississippi at Omaha, Neb., the Pan-American at Buffalo, N. Y., the Alaska-Yukon Pacific at Seattle, Wash., and the Panama-Pacific-International Exposition at San Francisco, Cal., in 1915. It attracted a large number of visitors and the most valuable exhibits ever made in the arts and sciences.

The leading expositions of the last thirty years, with the total paid and free attendance and the total receipts, including admissions and concessions, are as follows:

Expositions.	Attendance.	Receipts.
Vienna, 1872	7,254,687	$ 6,917,832
Philadelphia, 1876	9,910,996	3,813,724
Paris, 1878	16,032,725	2,531,650
Paris, 1889	28,149,353	8,300,000
Chicago, 1893	27,539,521	14,117,332
Paris, 1900	50,120,540	24,788,360
St. Louis, 1904	18,741,073	10,162,380

See **World's Columbian Exposition.**

EX POST FACTO (ĕks' pōst făk'tō), a law which is retroactive and makes an act criminal that was not criminal when committed, or increases the severity of the punishment attached to the crime when it was committed. The United States and the several states are forbidden by the Constitution to pass such a law.

EXPRESS (ĕks-prĕs'), a system of rapid conveyance and safe delivery of merchandise and parcels. The express business of the United States is the outgrowth of the custom under which stage-coach drivers, railroad conductors, and others were intrusted with parcels for delivery, and was formally organized by William F. Harnden (1813-1845), of Boston, in 1839. He contracted with the Boston and Worcester Railroad Company for the transmission of packages. The project commended itself to business men, and soon after express lines were organized and connections established in all directions. In 1849 the Adams & Company's California Express was established; in 1852, the Wells, Fargo & Company's; and in 1855, the American-European Company's. The express business is carried on by these and similar companies under contract with the railroad companies, the latter furnishing carriage along their lines, while the express companies attend to the receipt and safe delivery of parcels.

At present the capital stock of the express companies amounts to millions of dollars, the leading organizations being the Adams Express Company, Southern Express Company, American Express Company, and Wells, Fargo & Co. These and other lines have direct connections with responsible express companies in Canada, Newfoundland, and the leading countries of the world. Among the leading companies of Canada are the Dominion Express Company, the Canadian Northern Express Company, and the Canadian Express Company. The business comprises, besides delivering parcels of merchandise, the issuance of checks, collection of accounts, and in some cases the care of deposits. A system of C. O. D. business, meaning *collect on delivery*, comprises the plan of transporting goods to consumers or dealers and collecting the purchase price when delivered.

In most European countries the carrying serv-



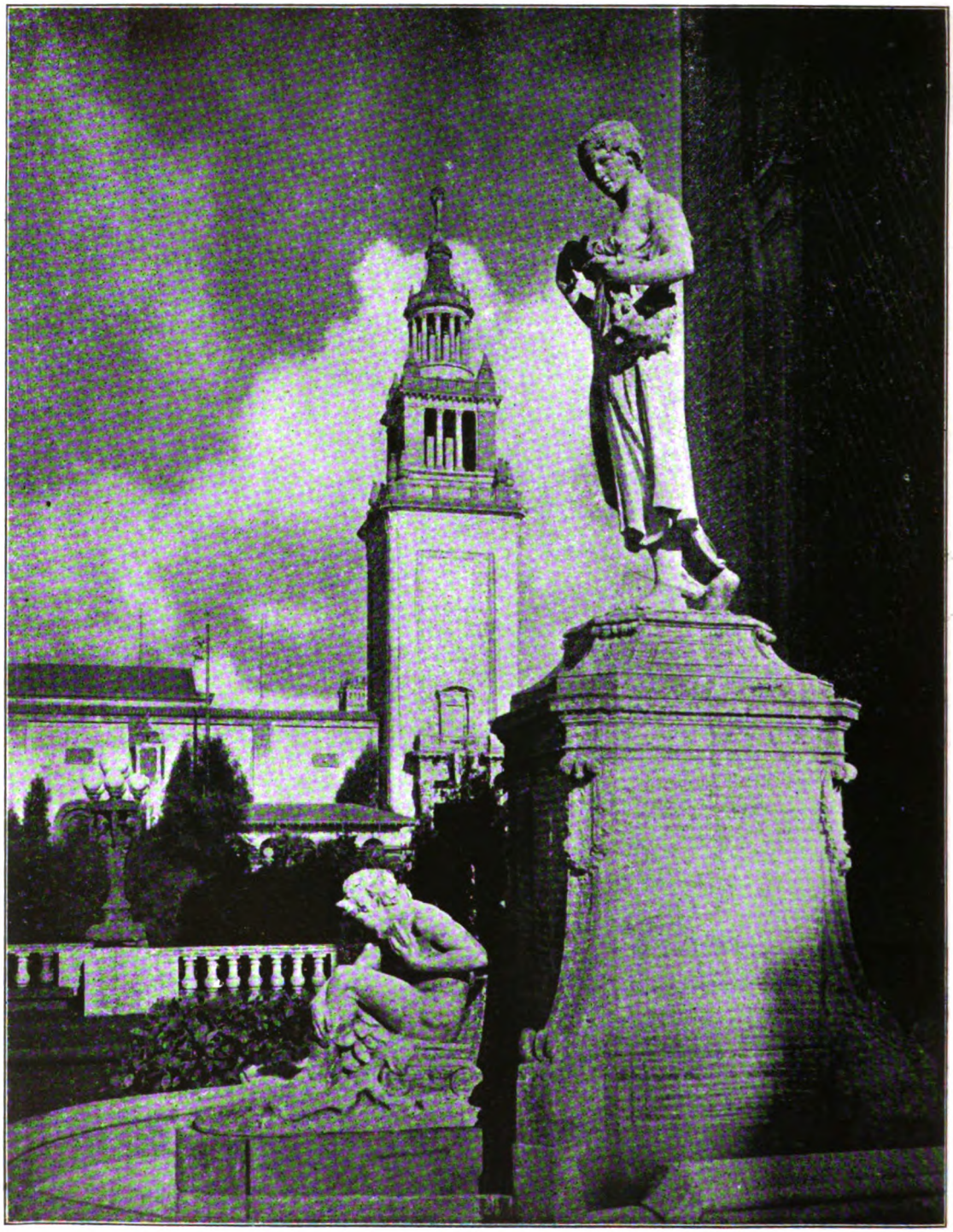
THE COURT OF FLOWERS.



THE SOUTH GARDENS FROM THE PALACE OF HORTICULTURE.

VIEWS OF THE PANAMA-PACIFIC EXPOSITION AT SAN FRANCISCO, CALIFORNIA.

(Opp. 960)



STATUARY AND HISTORICAL ARCHITECTURE AT THE PANAMA-PACIFIC EXPOSITION IN SAN FRANCISCO, CALIFORNIA.

(Opp. 960)

ice is performed by the post office system under the direction of the government, though in Great Britain the railroad companies themselves handle this branch of business on all lines where the parcel post has not been established. The law includes express companies with the list of common carriers, by which they are held liable for losses the same as such carriers, even though their bills of lading declare otherwise. Express money orders are receivable at banks, and payable in nearly all civilized countries of the world on an equal basis with drafts issued by banks or government postal money orders.

EXTENSION (ĕks-tĕn'shŭn), in physics, that property by virtue of which matter occupies space and possesses volume. An atom is exceedingly small, yet it has definite size; that is, it has extension, or occupies space in three dimensions—length, breadth, and thickness. Extension is necessarily possessed by molecules and masses and is, therefore, a general property of matter.

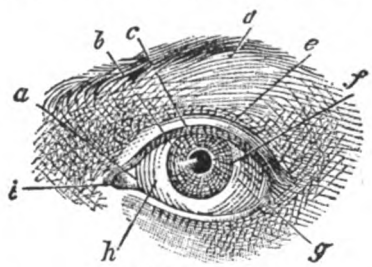
EXTRACT (ĕks'trăkt), in pharmacy, the products obtained by evaporating solutions that contain medical principles. The substances are chiefly of vegetable origin and yield solids and liquids, the former being known as *extracts* and the latter as *fluid extracts*. Solid extracts are obtained by digesting vegetable substances with water, alcohol, ether, or acetic acid, and evaporating the products until they are reduced to a pasty or dry consistence. Liquid extracts are made by crushing the plants to obtain the juices, which are heated and evaporated. Various methods are employed, the process depending upon the kind of extract to be obtained. In some cases the juices are allowed to stand a brief time after the masceration, when they are carefully filtered, and then are evaporated or distilled a number of times to obtain the strength required.

EXTRADITION (ĕks-trà-dĭsh'ŭn), the right to demand the delivery of a fugitive from justice from one state or nation to another. In the absence of treaties it is not the duty of a nation to turn over a fugitive criminal to the state from which he has fled, a position maintained both in England and the United States, hence extradition between nations is based upon treaties. However, extradition between the states or provinces of a particular country is usually regulated by the constitutional or national law. This is provided for by the Constitution of the United States, which requires that "a person charged in any State with treason, felony, or other crime who shall flee from justice and be found in another State, shall, on demand of the executive authority of the State from which he fled, be delivered up to and be removed to the State having jurisdiction of the crime."

The Jay Treaty of 1794 was the first treaty of the United States to provide for extradition, but it was not carried into effect by an act of Congress. The Treaty of 1842 was the first to provide for extradition between Great Britain and the United States. It is the general rule that a criminal who has been extradited for a particular offense cannot be tried on another charge. This question arose in 1875, when the United States procured the extradition of a criminal who had committed an offense not mentioned in the treaty, being extradited on one and then tried on another, and against this Great Britain protested. Extradition treaties are in force among all the leading nations.

EYCK (ik), **Hubert** and **Jan van,** two Flemish painters of the 15th century. The date and place of their birth are uncertain, though it is thought they were born at Maas Eyck and that they resided chiefly at Bruges and Ghent. The date of Hubert's birth is about 1366. His death occurred in Ghent, Sept. 18, 1426. Jan was born about 1389 and died in Bruges, July 9, 1440. These two painters are distinguished largely because they are the reputed inventors of oil painting and the founders of a Flemish school. The exquisite finish and beautiful coloring of their work have never been excelled. Many of the masterpieces executed by the two brothers are extant, the best being found in Bruges, Berlin, Antwerp, Ghent, Paris, and Munich. Three pictures painted by Jan in the years 1432, 1433, and 1434 are in the national gallery in London. The exquisitely finished production, "Chancellor Rollin Kneeling Before the Virgin," is in the Louvre, in Paris.

EYE, the organ of sight, consisting of a globe about an inch in diameter, situated in a bony cavity of the skull, and protected by the



THE HUMAN EYE.

A, semilunar fold; *B*, iris; *C*, pupil; *D*, eye-brow; *E*, eyelid; *F*, cornea; *H*, sclerotic coat.

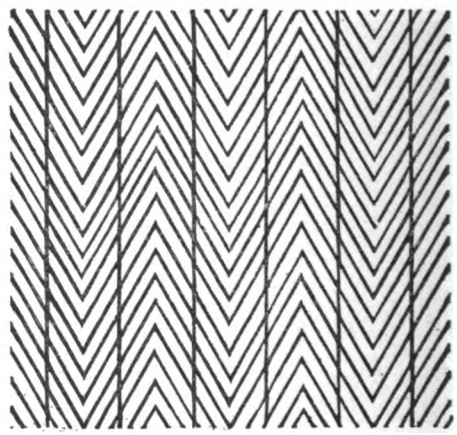
overhanging brow. It is formed of a tough membrane called the *sclerotic* coat, which gives form to the eye, the transparent, convex part in front forming the *cornea*. A thin, black membrane, termed the *choroid* coat, lines the sclerotic coat, which contains the blood vessels, while its black color serves to prevent the reflection of the rays of light. A very thin and transparent membrane, called the *retina*, is inside the choroid coat and is an expansion of the optic nerve. The anterior and posterior chambers are filled with a liquid, that in the former being a thin, clear liquid called the

aqueous humor, and that in the latter a thick, jellylike fluid termed the *vitreous humor.* These humors serve to keep the eye distended and in shape. Between the two chambers is the *crystalline* lens, which operates to bring the rays of light to a focus on the retina and is kept in place by the *ciliary* process. A curtain, called the *iris,* is hung behind the cornea, whose center is a hole called the *pupil.* The several colors observed in the eyes of different persons are merely the iris, which varies from blue to a dark brown and is seen through the pupil. The colorless effect seen in the eyes of the albino is due to the absence of color cells; the pink tint often seen in them is caused by the blood affecting the appearance of the iris on account of the absence of other coloring matter.

The eye is protected by close-fitting shutters called *eyelids,* and by a padding of fat situated between the eyeball and the walls of the orbit in which it is situated. A mucous membrane lines the inner side of the eyelids, and, by being exceedingly sensitive, aids in protecting the eye from irritating substances. The edges of the lids are lubricated by oil glands situated within the *eyelashes,* which prevent them from adhering to each other. Besides, the lashes guard against dust, while, with the lids, they serve to shield against a blinding light. The mucous membrane and cornea are moistened by a saltish fluid called *tears,* which is secreted by the *lachrymal glands,* two oblong bodies situated immediately above and to the outside of the eyeballs. Several ducts facilitate a flow of tears upon the inner surface at the outer edge of the upper eyelid, thus washing the eye and keeping it clean from dust, the tears passing into a little basin at the inner part of the eye near the nose, called the *lachrymal lake,* from which they are drained into the nose by the *nasal duct.* The lachrymal lake overflows upon the face in disease, old age, and when crying.

The phenomenon of sight is one of intense interest to the student of natural history. It is dependent upon a substance called *ether,* which is infinitely more subtile than air and is thought to be a thin gas filling all space. Waves of light are produced in the ether as sound waves are caused in the atmosphere. The motion waves of ether are produced by a light, for example a lamplight, pass through the pupil of the eye to the retina, and are carried by the rods and cones through the *optic nerve* to the brain, where the light is seen. The variously shaped rods and cones serving to carry the light are to the eye what bristles, otoliths, and Cortian fibers are to the ear. The optic nerve, which has its root in the brain and enters the eyeball, is itself insensible to light. There are no rods and cones at the point where it enters the eye and this is called the *blind spot.* The rays of light are bent by the convex lens so they meet at a point called the *focus;* a good example of this can be given by the use of a common burning glass, through which the focus point is heated to burning by bending the rays of the sun. When entering the eye, the rays of light are converged similarly by being brought to a focus on the retina, and are influenced somewhat in a like manner by the cornea and the humors of the eye.

Distant objects tend to diverge rays of light less than those near by, and under such conditions the crystalline lens does not need to bend so much as in seeing objects near at hand. This property of adjusting the lens of the eye to far or near vision is called *accommodation.* The ordinary adjustment of the eye muscles when at perfect rest is of such a character that objects at all distances over twenty feet can be seen clearly. Objects at a smaller distance than twenty feet away from the eye require that the muscles adjust the lens to a more curved position. In this way it is possible for the eye to see clearly at a distance



AN OPTICAL ILLUSION.

of about five inches, while vision is best at about ten inches from the eye.

The field of view in which a person can clearly recognize objects is confined to a small space immediately in front of the eye, while only indistinct shadows seem to occupy the remainder of space near at hand. In reading not more than two or three words can be seen distinctly, but by rapid and unconscious movements of the eyes sidewise the field of view is greatly enlarged. When the eyes are directed toward an object, the sensation of sight is produced almost instantly, but the image persists about one-tenth of a second. It is due to this property that a lighted stick waved rapidly by the hands appears as a circle of fire. Exhibitors take advantage of it by throwing a succession of pictures of a moving object upon a screen at a particular rate, and thus convey to the auditors the effects of movement without interruption. If two shining lights are waved,

they appear as one, and two colors revolved quickly give the effect of a mixture of two. Thus, a yellow and a blue surface placed side by side and revolved quickly before the eye appear as a single green spot. The eye is subject to many illusions, which is taken advantage of by exhibitors and in the manufacture of many toys and fireworks. The vertical lines in the illustration are perfectly parallel, but the diagonal hatching, as the result of contrast, cause them to appear tapering in alternate directions.

Color-blindness is due to an impairment of the nerves of the retina, leading to an inability to recognize certain colors. Since locomotive engineers and sailors are guided by differently colored signals, this defect is a serious one. The retina becomes exhausted when the eye looks steadily at an object for a long time. It is fatigued by bright-colored objects much more readily than others, and during a state of exhaustion is often confused in the recognition of colors, being made color-blind. The intensity of light has an effect upon the pupil, bright light causing a contraction. This results from a strong light exciting the reflex centers of the optic tubercles and has the effect of contracting the muscles of the iris. In the dark, on the other hand, the pupil is enlarged so as to admit all the light possible. In this way, and by means of the muscles that control the upper and lower lids and the eyebrows, it is possible for the eyes to protect themselves against a light too strong to be admitted, though the contracted muscles become easily tired and pain results. *Far-* and *nearsightedness* are caused by defects in the crystalline lens. If the lens is too convex, the rays are brought to a focus before they reach the retina; if too flat, the retina is reached before coming to a focus. In each case the sight is more or less indistinct. Another common defect is a flattened or elongated shape of the globe of the eye. Farsightedness results when the globe is flattened and nearsightedness when it is elongated. The former is overcome by convex and the latter by concave lenses.

The care of the eyes is an important matter, since the loss of vision is a source of much sorrow. Glasses should be worn when they serve to improve the sight, since straining impaired power results in even greater weakness. Fine print and reading by a dim light are harmful, while the sight is often impaired by reading on cars, for the reason that the lens becomes wearied by striving to adapt itself to continuous variations of distance. Light should never be in front when reading or working, but should come over the left shoulder. Alcohol and tobacco tend to cause dimness of vision by weakening the optic nerve. Röentgen (q. v.) discovered a kind of light produced by electricity, in 1895, which penetrates flesh, wood, and other substances. By means of this light it is possible to determine by sight the forms of different organs of the body, to examine the bones in the living body, and to locate many substances foreign to the system. Several valuable discoveries relative to the eye have been made by means of it.

The eyes of fishes, reptiles, birds, and quadrupeds are essentially the same as in man. In insects the eyes are immovable and have a dome shape. Thousands of smaller eyes like honeycomb make up each of the two eyes. At the bottom of the cavity is a nerve to which each little eye may conduct light by means of a lens. As the scale of animal life descends, there is a marked decrease in the power of vision. For instance, in the leech the nerves of sight end in a spot of dark coloring matter of the skin by means of which it is able to receive some idea of its surroundings. Still lower in the scale we find life forms that are barely able to recognize the difference between light and darkness, while those that live wholly in the dark lose the use of this organ, as, for instance, the fish found in the Mammoth Cave of Kentucky.

EYELIDS. See **Eye; Lachrymal Glands.**

EYLAU (ī'lou), a town in Germany, 22 miles south of Königsberg, on the Pasmar River. It was the scene of an indecisive battle on Feb. 8, 1807, between Napoleon and the allied forces of the Prussians and Russians under Count Levin Bennigsen (1745-1826). The army under Napoleon consisted of about 80,000 men, while the allied forces were smaller, but the latter possessed more artillery. A brisk struggle continued during the day, and as night approached the troops of Napoleon were driven before the allies. In the night the French army retreated. The loss on each side is estimated at about 18,000 men. The town has a population of 3,600 and is connected by railway with Königsberg.

EYRE (âr), one of the largest lakes in Australia, in the State of South Australia, at an altitude of 80 feet. It has an area of 3,708 square miles. Its name is from Edward John Eyre, who discovered it in 1840. The water is highly salty and in dry seasons evaporates largely, leaving a great salt marsh. The waters of the Macumba, Cooper, and Warburton rivers flow into it, but it has no outlet to the sea. A railway extends from Lake Eyre to Spencer Gulf.

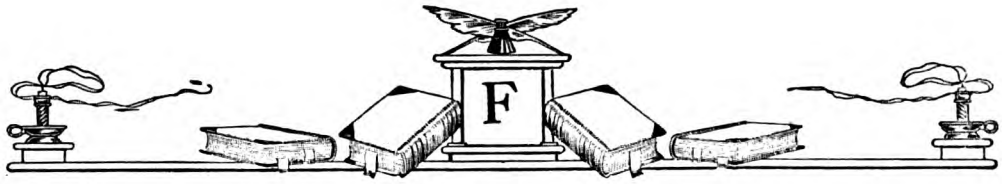
EYRE, Edward John, explorer, born in Yorkshire, England, in 1815; died Nov. 30, 1901. He emigrated to Australia in 1833, where he explored the south coast and in 1840 discovered Lake Torrens. Subsequently he was Lieutenant Governor of New Zealand and later held a similar position in Jamaica, where he suppressed a negro insurrection with much severity. He returned to England in 1866, where he was prosecuted for murder by a committee of which John Stuart Mill was a member, but

was eventually justified for his course of executing the leader of the insurrection.

EZEKIEL (ē-zē'kĭ-el), meaning strength of God, the third of the four greater prophets of Israel, to whom is attributed one of the books of the Old Testament. He was the son of Buzi, a priest, and was carried captive to Mesopotamia along with Jehoiachin, King of Judah, about eleven years before the destruction of Jerusalem under Zedekiah. There with other Jews he settled on the banks of the Chebar River and began his work as a prophet in 594 B. C. His prophecies are mostly in chonological order and consist of three parts—those relating to the complete overthrow of the Jewish nation on account of increasing unfaithfulness to God, those threatening the surrounding nations with divine punishment, and those pertaining to the future deliverance of the Hebrew nation and the rebuilding of Jerusalem. Ezekiel's death is not recorded, but it is thought his prophetic career extended over a period of 22 years.

EZEKIEL, Moses Jacob, sculptor, born in Richmond, Va., Oct. 28, 1844; died March 27, 1917. He attended the public schools, served during the Civil War in the Confederate army, and in 1869 went to Europe to complete his higher education. At the Academy of Art in Berlin he studied sculpture, and later established a studio at the Baths of Diocletian in Rome. His works have been exhibited in Cincinnati and New York City, and in the art galleries of Berlin and Rome. His "Religious Liberty" is a group modeled for the Jewish Order of the Foreign Covenant and is now in Fairmount Park, Philadelphia. He designed and completed the Jefferson monument in Louisville, Ky. Later he prepared eleven statues of famous artists for the Corcoran Gallery in Washington, and made relief portraits of Longfellow, Liszt, Hohenlohe, Lee, and Farragut. Other works completed by him are "Judith," "Man and Cupid," "Eve Hearing the Voice," "Apollo and Mercury," and "The Daughters of Eve."

EZRA (ĕz'rà), Jewish priest, a descendant of Aaron, whose patriotic and priestly services to the Jews are detailed in the book bearing his name. He was a ready scribe in the law of Moses, to which he was passionately attached. An exile in Persia, he so commended himself to the reigning monarch, Artaxerxes, as to obtain from him permission to lead the second expedition of the Jews back to their own land. This enterprise began about 458 B. C. Subsequently he resided in Babylonia and still later at Jerusalem, where he endeavored to reimpose more strictly the laws of Moses, forbidding marriages with heathen women and annulling such ties where they had been formed. He introduced into the Jewish literature the square Chaldee characters, in place of the old Hebrew forms that had been customary until then. The place of his death is uncertain. The *Book of Ezra* spans a period of eighty years, from Cyrus in 536 B. C. to Artaxerxes in 456 B. C. Some biblical scholars believe it to be from the pen of Ezra, while others admit a plurality of authors. Both Jews and Christians consider the work part of the Scripture canon.



F, the sixth letter and fourth consonant of the Latin and English alphabets. It is formed by the passage of breath between the upper front teeth and the lower lip, is classed with V as a labio-dental, and belongs to the class of consonants called *aspirates.* The figure of F corresponds to the *digamma* of the Greek and resembles it closely in power. F, in music, is the fourth note of the natural diatonic scale of C. F major, as a key, has one flat at its signature, namely, B flat. The tone F is called *fä* in Italy, France, and some other countries.

FABER (fā'bĕr), **Cecilia Bohl von.** See **Caballero, Fernan.**

FABER (fā'bĕr), **Johann Lothar,** born at Stein, Germany, June 12, 1817; died in 1896. He inherited from his father a small factory at Stein, which he enlarged and gave to it an international reputation for the manufacture of lead pencils. Later he established offices in Berlin, London, Paris, and New York. He founded extensive mills at Cedar Keys, Fla., where he obtained large quantities of cedar wood for exportation and use in his enterprises. Afterward he enlarged his manufactory by adding to the list of products all sorts of materials for drawing, painting, and writing. A patent of nobility was conferred upon him in 1863 and later he became a counselor of state. A large portion of his fortune was devoted to the establishment of schools and charitable institutions.

FABIUS MAXIMUS (fā'bĭ-ŭs măx'ĭ-mŭs), a distinguished member of an illustrious patrician family of Rome. The Fabii family established a foothold by undertaking to defend its territory against the Veientes, with whom they had been at war, but in 477 B. C. they were all killed, except one member who had remained at Rome. Through this survivor the family was perpetuated. Fabius Maximus was the most distinguished of the second Fabii family. He served five times as consul and twice as censor, and, after the Roman defeat at Trasimenus, was elected dictator. In the second Punic War he attained eminent success against Hannibal by the Fabian policy of war. This policy consisted of avoiding a direct engagement, harassing the enemy by surprises, annoying them by marches and flank movements, and destroying their foragers and stragglers. While he pursued this policy, Rome assembled her forces and prepared them for greater efficiency in common defense against the enemy. In the fifth consulship Fabius recovered Tarentum, an important position that had long been possessed by Hannibal. His death occurred in 203 B. C.

FABLE (fā'b'l), a feigned story or tale intended to enforce some moral precept. In modern literature the fable is confined to short stories, either in prose or poetry, in which inanimate things and animals are represented with human interests and passions. By the novelty and utter impossibility of the representation, the interest of the hearer or reader is excited, and thus its symbolic meaning and moral become apparent to him, at least if the fable is well contrived. The ancient fabulists were simple, clear, and earnest, and seem to have sprung up in the East. Among the more celebrated are Bidpai, or Pilpai, and the Arabian Lokman, who lived at the time of King David. Among the Greeks the greatest fabulist is Aesop. Phaedrus, the most celebrated Roman fabulist, cleverly imitated Aesop, but with considerable modification, thus giving force to his writings. In later times Gay among the English, Lessing and Gellert among the Germans, and Krylov among the Russians are celebrated. La Fontaine, a French writer of fable, for delicate sarcasm, sagacity, and felicity of expression takes high rank.

FABRICIUS (fȧ-brĭsh'ĭ-ŭs), **Caius,** an ancient Roman who was noted for his characteristic virtue in moderation, fearless integrity, and contempt of riches. He was elected consul in 283 B. C., defeated the Boii and the Etruscans the same year, and was sent on a mission to treat with Pyrrhus the following year. Notwithstanding the fact that he held numerous lucrative offices, he died poor, and the state provided funds for the support of his daughter. In recognition of his military achievements and incorruptible integrity, a decree was made by the senate which provided a burial place within the city for him and his descendants.

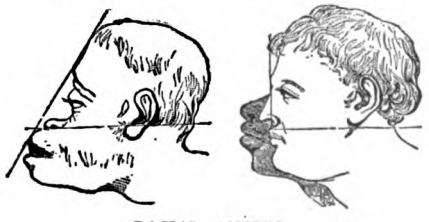
FABRICIUS (fȧ-brē'sê-o͝os), **Johan Christian,** entomologist, born in Tondern, Germany,

Jan. 7, 1745; died in Kiel, March 3, 1808. He was educated at Copenhagen, Leyden, and Freiberg, and obtained a professorship in the University of Kiel. Besides his excellent service in teaching natural history, he wrote a number of treatises on entomology and outlined a policy of economy for Denmark. Among his publications are "System of Entomology," "Philosophical Botany," and "Philosophical Entomology."

FAÇADE (fȧ-sȧd'), the exterior face or front of a building. This term is applied chiefly to classic architecture and buildings of some magnitude. The façade contains the principal entrance. The term is used with a qualifying adjective when it refers to other faces of a building, as *court façade, rear façade,* and *lateral façade.* Many mediaeval churches have *false façades,* which are different in outline than the buildings themselves.

FACE, the front part of the human head, extending from the chin to the line of the hair on the forehead. It includes the nose, eyes, chin, mouth, cheeks, and forehead. The bony foundation is composed of fourteen bones, twelve of which occur in pairs. The single bones are the *vomer,* which separates the nostrils, and the bone of the lower jaw, or *inferior maxillary,* which is the only one that is movable. The *superior maxillary,* or upper jaw bone, contains the upper teeth. Two *malar* bones form the cheeks; two *palate* bones, the palate; and two *turbinated* bones, the outer walls of the nostrils. Between the eye socket and the nose are two *lachrymal* bones. The bridge of the nose is formed by two *nasal* bones. All of the bones of the face are irregular in form. Beneath the *frontal* bones, which belong to the cranium, are two deep quadrangular cavities, called the *orbis,* which contain the eyeballs, the tear apparatus, and the protective organs of the eye. In the depressions and small cavities are located glands, nerves, and blood vessels. Projecting jaws and a receding forehead are prominent features in the face of brutes.

FACIAL ANGLE (fā'shạl ăn'g'l), an angle formed by two imaginary lines—one drawn



FACIAL ANGLES.

from the most prominent part of the forehead to a point opposite the incisor teeth; the other from the external ear to the same point, the object being to measure the elevation of the forehead. This angle was made the basis for classifying the races by the Dutch anatomist, Pieter Camper, and is sometimes called *Camper's Angle.* While it has served a useful purpose in ethnology, it is not an infallible criterion of the intellectual capacity of an individual. The general facial angle of anthropoid apes is 40°, of the African Negro 70°, and of the Europeans 80°. Since angles almost as varied can be found in a single large community, the Camper method has been superseded by those of Blumenbach, Cuvier, etc.

FACTORY (făk'tŏ-rў), a name derived from the word *factor,* which, in Great Britain, has reference to an agent who sells goods for another. In America it is more common to call such an agent a commission merchant, since his compensation is based on a commission or a percentage upon the goods he buys or sells. On the other hand, the word *factory* has reference to the place or house where such agents transact business.

Within recent years the term factory has come to be applied to an establishment devoted to the manufacture of various articles of commerce. In this sense it includes the machinery and buildings necessary to such manufacture. The establishment of great factories is comparatively recent and resulted from the invention of useful machinery, the extensive subdivision of labor, and the construction of vast avenues of commerce that facilitate the transportation of manufactured commodities to distant consumers. Doubtless material advantages have sprung up from the factory system. They include the increased productiveness resulting from the division of labor; greater mechanical accuracy and a lessening of the cost of production, two results of bringing together different laborers with varied capacity; and the wholesome effects that follow coöperation and copartnership among the masses of the workingmen. Trades unions and the various forms of organization that have sprung into existence are the direct result of the concentration of laborers in manufacturing centers.

It is probable that the good which springs from the factory system is counterbalanced to a large extent by the curtailment of independent intelligence, which follows the minutely subdivided operations resulting from the piecework of each individual workman. Other disadvantages urged against the factory system are the evil influences upon the health of the workmen, brought about by being crowded into small rooms; the contract system, by which large colonies of foreign laborers are imported; and a reduction of wages as a natural consequence of employing many children and women.

The factory system as now found in America, both in Canada and the United States, has made it necessary to regulate by law the manner of managing workshops, mines, and factories. Legislation along this line has been intended to improve the sanitary conditions of all places where large numbers of workmen are employed

by making them subject to public inspection, and establishing rigid rules under which vast enterprises may be managed efficiently. Among the primary objects of legislation are the protection of life and health of the workmen, prevention against spreading infectious diseases and vermin by reason of the manufactured product, and protection of the laborers and operators against strikes, disorders, and general disorganization of institutions. Legislation has been directed more commonly with respect to the number of hours the workmen may be employed daily and the improvement of the conditions of factory work. Other objects have been to limit the labor of women and minors and to regulate the manner of and time for which laborers shall receive compensation.

Statutory provisions in some cases forbid the employment of minors under certain ages, while in others it is necessary for children to be able to read and write, or to have attended school for a certain period, before being admitted to the factory. These safeguards are intended to prevent the corruption of morals among children and vouchsafe to them conditions under which they may secure a suitable education. The supreme courts in a number of states, among them Ohio, Pennsylvania, Missouri, West Virginia, and Illinois, have decided that laws which require the payment of laborers in money are unconstitutional, though others have held them sound and operative. Among the many questions of general concern, in which a large number of people are interested, those relating to the rights and privileges of both the employer and employee take high rank. However, the legislation which may tend to secure the best business conditions, which will operate to the highest interest of both the capital and labor employed in the factory system, is yet awaiting solution by statesmen and legislators.

FACULTY (făk'ŭl-tȳ), the term employed to designate collectively the teachers and professors of an institute, college, or university, or the instructors in any department of such an institution, as the faculty of law, of theology, of arts, or of medicine. It is applied collectively to the members of the learned professions, as the faculty of advocates, the medical faculty.

FACULTY, in mental science, a natural power of the mind by which it acts uniformly and with facility in some specific way. Hewett defines faculty as a power under the control of the will, having a specific work to do, and as examples enumerates memory, seeing, love, and judgment. Crabb holds that faculty is a power derived from nature, and differs from ability in that the latter is derived either from circumstances or otherwise.

FAED (fād), **Thomas,** noted painter, born in Burley Mills, Scotland, June 8, 1826; died Aug. 17, 1900. He became an associate of the Royal Scottish Academy in 1849, a member of the Royal Academy in 1861, and an honorary member of the Vienna Royal Academy in 1875. Among his earliest drawings in water colors is one entitled "Old English Baron." The most celebrated of his newer works are "Mitherless Bairn," "The First Break in the Family," "From Dawn to Sunset," "Reading the Bible," "The Last of the Clan," and "Scott and His Friend at Abbotsford."

FAHRENHEIT (fä'ren-hīt), **Gabriel Daniel,** eminent physicist, born in Dantzic, Germany, May 14, 1686; died Sept. 16, 1736. He studied for commercial business, but soon abandoned his early desires and entered upon the study of natural philosophy. Soon after he traveled extensively and later settled in Holland, where he took a course under Gravesande in science and formed the friendship of many noted men. In 1714 he discovered that quicksilver possesses greater utility for use in construction of thermometers than spirits of wine, which had been employed previously. In devising a thermometric scale he took as the *zero point* the lowest temperature observed by him in the winter of 1709 at Dantzic, which he found was produced by an equal quantity of snow and salt. The space between this point and that to which the mercury rose at the freezing point of water is divided into 32°, and from zero to the boiling point of water into 212°. Later he contrived a machine for draining swamp lands. In 1724 the Royal Society of London elected him a fellow. The Fahrenheit thermometer is generally used in the United States for all practical purposes. See **Thermometer.**

FAÏENCE (fa-ē-äns'), a term applied generally to all classes of porcelain and glazed earthenware. The name was derived from the town of Faenza, Italy, where *majolica,* a fine grade of pottery, was manufactured in the 14th century. The faïence manufactured at present was invented in the 16th century as an imitation of majolica and obtained its name in France. However, the faïence of the market is made of a ruddy earth, covered with an enamel, and is frequently painted in rich colors.

FAINTING (fānt'ĭng), or **Syncope,** a sudden loss of consciousness, with pallor and feeble respiration and heart action. The morbid condition generally continues from a few seconds to a minute, but in some cases lasts for hours and even days. It is produced by loss or sight of blood, pain, or impure air generated in overcrowded public buildings. Fright and sudden joy or grief may cause fainting in some persons. It rarely ends in death and more commonly affects women than men. Recovery is most rapid when the body is in a recumbent position. Fresh, cool air, cold water sprinkled on the face, and the loosening of any tight articles of dress contribute to a speedy close of the syncope.

FAIR, a stated or regular market where buyers and sellers gather to transact either a par-

ticular or general class of business. Fairs of this character originated on account of the convenience resulting from the buyers and sellers of agricultural products common to a region coming together. The fairs held in the Middle Ages were chartered by public officials, who announced them by proclamation. This class never obtained a wide foothold in America, though there are fairs at which an exhibit of agricultural products, manufactures, and other articles of value are exhibited for public inspection and study. The term is applied in a general sense to bazaars where fancy articles are offered for sale either at special times or permanently, and to the agricultural and industrial exhibitions held under the direction of counties, states, or nations. In Europe it is quite common to hold fairs at which buyers and sellers are brought together. Among the great periodical fairs are those held at Novgorod, Russia; Lyons, France; Leipzig and Frankfort-on-Main, Germany; the Donnybrook Fair, Ireland; the Glasgow Fair, Scotland; and the Greenwich Fair, England.

FAIRBAIRN (fâr'bârn), **Sir Andrew,** railroad magnate, born in Glasgow, Scotland, March 7, 1828. He descended from a prominent family, was educated at Cambridge University, and was soon after called to the bar. In 1856 he formed a partnership with his father, Sir Peter Fairbairn, a manufacturer of tools and implements. In 1866-68 he served as mayor of Leeds, was knighted soon after, and became interested in the Great Northern Railway. He served as commissioner at the Paris exposition in 1878, and was a member of the House of Commons for twelve years, beginning in 1880. Fairbairn was prominently connected with several international railway congresses of Europe. The King of Belgium knighted him, and in 1892-93 he served as high sheriff of Yorkshire.

FAIRBAIRN, Andrew Martin, theologian, born in Edinburgh, Scotland, Nov. 4, 1838; died Feb. 9, 1912. He was educated at Edinburgh, Glasgow, and Berlin, and in 1861 began his ministry at Bathgate, Scotland. In 1878 he was made lecturer in the University of Edinburgh, became chairman of the Congressional Union of England and Wales in 1883, and was chosen principal of Mansfield College, Oxford, in 1886. In 1890 he visited the United States and subsequently lectured at a number of leading educational institutions of America. His publications include "Studies in the Life of Christ," "The Place of Christ in Modern Theology," "Catholicism, Roman and Anglican," and "The Philosophy of the Christian Religion."

FAIRBAIRN, Sir William, civil engineer, born in Kelso, Scotland, Feb. 19, 1789; died April 18, 1874. After securing a rudimentary education, he was apprenticed as an engine-wright in North Shields, and soon after commenced business at Manchester, where he made several important inventions that led to the use of iron shafting in cotton mills. His attention became attracted to the use of iron as a material in bridge and ship building about 1831, which enabled him to obtain many patents on practical inventions, and was the immediate cause that led to the construction of several thousand bridges. Later he became extensively interested in iron shipbuilding at Manchester and Millwall, near London, and produced many useful and serviceable vessels. He was made a baronet in 1869 and later a chevalier of the Legion of Honor. In connection with Robert Stephenson he constructed a tubular bridge across the Menai Strait. Among numerous works and papers published by him are "Our Canal Steam Navigation," "Iron and Great Britain," "A Treatise on Mills and Mill Work," and "The Strength of Iron at Different Temperatures."

FAIRBANKS, Charles Warren, statesman, born on a farm near Unionville Center, Ohio, May 11, 1852. He graduated at the Ohio Wesleyan University, was admitted to the bar in 1874, and established a successful practice at Indianapolis. In 1897 he was elected United States Senator as a Republican, and the following year served as a member of the British-American joint high commission. He was reëlected to the United States Senate in 1903, and the following year became Vice President of the United States, serving until 1909. In 1916 he was nominated for Vice President but was defeated in the election.



CHARLES W. FAIRBANKS.

FAIRBANKS, Erastus, manufacturer, born in Brimfield, Mass., Oct. 28, 1792; died Nov. 24, 1864. He entered upon the study of law, but soon began the manufacture of cast-iron plows and castings. In 1824 he located a plow factory at Saint Johnsbury, Vt., but later gave his entire attention to the manufacture of platform scales invented by his brother, Thaddeus Fairbanks (1796-1886), who was jointly interested in the enterprise. Erastus was a member of the State Legislature in 1836-38, became president of the Passumpsic Railroad Company in 1849, and was elected Governor of Vermont in 1851, and again in 1860. The scales manufactured by the firm, though modified by improvements, are in general use throughout the United States. His brother, Thaddeus, was born Jan. 17, 1796; died April 12, 1886. He worked in a saw and grist mill with his father and patented the well-known Fairbanks plat-

form scales in 1831. The patents held by him covered about fifty useful inventions. He was granted the cross of the Order of Francis Joseph by the Emperor of Austria in 1873.

FAIRBURY, county seat of Jefferson County, Nebraska, 56 miles southwest of Lincoln, on the Chicago, Burlington and Quincy, and other railways. Water power is derived from the Little Blue River. It has manufactures of flour, castings, and machinery. The features include the high school, courthouse, city hall, public library, and federal building. It was settled in 1869 and incorporated in 1886. Population, 1910, 5,294.

FAIRCHILD, James Harris, theologian, born in Stockbridge, Mass., Nov. 25, 1817; died there March 19, 1902. In 1838 he graduated at Oberlin College, where he became professor of languages in 1842. He was elected president of the institution in 1866. In 1870-71 he traveled in Eurasia and Africa, and subsequently in the Hawaiian Islands. Among his works are "Elements of Theology" and "Moral Philosophy."

FAIRCHILD, Lucius, soldier, born at Franklin Mills, Ohio, Dec. 27, 1831; died May 23, 1896. At the second battle of Bull Run he had command of the famous "Iron Brigade," and later fought at Antietam and Gettysburg, losing an arm at the latter engagement. In 1863 he was commissioned brigadier general, served three terms as Governor of Wisconsin, and in 1872 was appointed consul at Liverpool. He was commander in chief of the Grand Army of the Republic in 1886.

FAIRFAX (fâr'făks), **Thomas, Lord,** distinguished general, born in Denton, England, Jan. 17, 1612; died near York, Nov. 12, 1671. He studied at Cambridge, and soon after entered the military service in Holland. In 1644 he distinguished himself in the Battle of Marston Moor, and the following year received a command in the parliamentary forces. He refused to march against the Scots in 1650 and the command was given to Cromwell. After retiring to private life in 1660, he received an appointment as commissioner to The Hague to negotiate the return of Charles II. to England. He published several works in prose and poetry, the one entitled "Short Memorial" being the best known.

FAIRFIELD, a city of Iowa, county seat of Jefferson County, 48 miles northwest of Burlington, on the Chicago, Burlington and Quincy and the Chicago, Rock Island and Pacific railroads. It has a fine county courthouse and is the seat of Parsons College. The manufactures include wagons, clothing, machinery, tile, and farming implements. It has electric lights, waterworks, and a considerable trade in produce and merchandise. The first settlement in the vicinity was made in 1839 and it was incorporated in 1847. Population, 1910, 4,970.

FAIRHAVEN. See **Bellingham.**

FAIRIES (fâr'ĭz), the name applied to imaginary beings, ordinarily small and of graceful human form, but capable of assuming any shape and working good or evil to mankind. A belief in fairies has been among the superstitions of many peoples. Some other names for these imaginary creatures are *elves, brownies, goblins, dwarfs, pixies, kelpies,* and *gnomes.* It is difficult to give any scientific definition of the nature of fairy superstitions, because they followed no regular law, human or divine, but obeyed the impulse of their own caprice. Hence, every fairy tale differs from others in some respects. In the parts of the world where there are mountains, mists, cataracts, and stormy oceans all superstitions are naturally exaggerated, while in flat and well-cultivated countries the fairies are simple and homely, and connect themselves with matters of domestic routine, such as sweeping the floor, skimming milk, preserving butter, and other household duties. In Scandinavian countries the fairy people are connected with storms and convulsions. They are represented in the act of betraying people into dangerous places, flying away with them into cloudland, or as leading them through endless caverns within the earth. They have been spoken of in Ireland as a wandering remnant of fallen angels.

The tales of some nations divide fairies into three classes—those that dwell in the upper air, those within the interior of the earth, and a third class that frequent the waters. The last mentioned are known as *mermaids* and *sirens.* Fairy stories were introduced into France and Germany as early as the 12th century. They became generally popular in the latter part of the 17th century, the Italians taking the most extended interest in them. Literature in all countries abounds more or less with fairy tales. Among the best collections of later times are those of the Grimm brothers in Germany, Knightley's and Craker's in English, and Hans Andersen's in Danish. Many fairy tales and legends have been translated into modern languages and in this way became the common property of all. The translations have been devised suitably for home and school reading. Many of the eminent teachers, among them Herbart, Froebel, and Pestalozzi, have recommended them as of special value in child culture during the formative period. Their use for that purpose in American and European schools is very extensive.

It is quite probable that fairy tales and legends are the outgrowth of mythology and folklore. Since primitive peoples are unable to express ideas in the abstract, their customary forms gave rise to the use of familiar and concrete terms. The mystery of storms, zephyrs, caves, ocean waves, mountain echoes, passage of clouds, and the strangeness of life and death all had more or less influence to impress them with awe and to inspire and amaze. The early history passed from generation to generation,

not in written story, but as a living tale, and later became perverted in mythology, folklore, and fairy tales. To their own legends were added those of near or distant peoples, by which the tales they told grew into vast numbers and took on diversified and complicated forms. The giant stories of the Orient, the one-eyed Cyclops tales of Asia Minor, and the mysteries of the Greek and Roman gods were capable of almost indefinite expansion and contraction, especially when brought in contact with the northern heroes and the tales of the *Nibelungenlied*. In pondering the early peoples it is not difficult to comprehend how the folklore, mythology, and hero worship became prolific sources for the growth of numerous and diversified tales, and, associated with the romance of the ages, gave rise to a vast number of stories that have come down to us. Many of the fairy tales remain highly interesting and fruitful objects of study.

FAIRMOUNT (fâr'mount), a city in West Virginia, county seat of Marion County, on the Monongahela River, 75 miles southeast of Wheeling. It is on the Baltimore and Ohio and other railroads. The surrounding country is a farming and coal-producing region. Among the noteworthy features are the county courthouse, the high school, and a State normal school. The manufactures include earthenware, flour, cigars, machinery, and furniture. It has systems of electric lighting, sewerage, and waterworks. Population, 1900, 5,655; in 1910, 9,711.

FAIR OAKS, a railroad station in Virginia, near the Chickahominy River, in Henrico County, six miles east of Richmond. It was the scene of a battle between the Confederates under General Johnston, numbering 38,000 men, and a detachment of General McClellan's army under Gen. Silas Casey (1807-1882) and General Keyes, including about 11,000 troops. The engagement at Fair Oaks took place on May 31, 1862, after General Johnston had retreated from Williamsburg toward Richmond, and was the first important encounter between the army of the Potomac and the army of northern Virginia. General Longstreet drove the Federals back toward the Chickahominy and at nightfall the victory seemed to rest with the Confederates. However, the following day the Federals were reënforced and the battle continued at Seven Pines, about a mile east of Fair Oaks, when the Confederates were repulsed and withdrew to the immediate vicinity of Richmond. The loss on the Union side in both engagements was 5,031 and on the Confederate side, 6,134 men. General Lee succeeded General Johnston while the battle was in progress and General McClellan likewise succeeded General Casey. The battle ground may be reached by an electric railway. A national cemetery is maintained at Seven Pines.

FAIRWEATHER, a mountain on the western coast of North America, in Alaska, between Glacier Bay and the Alsek River. Southeast of it are a number of elevated peaks, including Mount Crillon. It is 15,292 feet above the sea, is covered perpetually with snow, and is the source of several glaciers.

FAITH CURE, the treatment of diseases without the use of drugs, usually practiced by making an appeal to the hope or belief of the patient. It differs from hypnotism and healing by mental science in that its methods require the exercise of religious faith, but the term *faith cure* is applied in a broader sense by some who believe in treating diseases without employing material means, and when applied in this form it includes every method of treatment in which the patient is to rely upon hope and faith. The practice of using home remedies and patent medicine is sometimes designated as a form of faith cure and some include Christian Science, but the latter term is not admitted to be similar by those who believe in it.

Faith cure is not of modern origin, but instead, dates from the most ancient times. That prayer is of utility in effecting cures has been taught by the Christian Church from its origin, and many eminent divines have preached that prayer is potent in the cure of bodily ills as well as in the forgiveness of sin. Some have gone so far as to teach that the atonement includes the healing of the body, since, as they believe, God would be dishonored if it were claimed he could not do more than preserve the soul. To this class belongs A. B. Simpson, of New York, who anointed with oil and practiced the apostolic methods. John Alexander Dowie, first apostle of the Christian Catholic Church, taught that diseases may be cured by prayer and the laying on of the hands. In the chapel of that church at Zion City are many canes, crutches, and trusses that are claimed to have been left there by people who came diseased and crippled and went away healed. Many others could be named who practiced the art and professed to effect cures. Those who believe in some form of faith cure have multiplied greatly within the last few decades.

While the cure of diseases and the treatment of patients must necessarily involve the use of material means and the employment of drugs, it is admitted on every hand that hope and expectation are mental states of great utility in those who suffer pain and disease. Digestion is favored by happiness, emotions stimulate action of the bladder, and sorrow causes secretion of tears in the lachrymal glands. There is no difference between those who practice medicine and those who believe strictly in faith cure so far as the favorable influence of hope and expectation is concerned, but the disagreement lies in the fact that one employs drugs and other material means, while those who hold distinctly to faith cure rely exclusively upon

some mental or psychological influence, or place reliance wholly in the efficacy of prayer. No doubt, many forms of nervous diseases can be remedied by faith-cure methods. However, their efficiency in the treatment of other ailments likely depends largely upon improved conditions of living and a change to better conduct and habits. It is undoubtedly natural for those who become converted to a new teaching, or a different plan of living than that they formerly embraced, to have mental changes which influence, more or less. In some diseases, such as consumption, cancer, and diphtheria, few if any cures are reported, though conditions are frequently improved.

FAITHFUL (fāth'fụl), **Emily,** authoress, born in Headley Rectory, Surrey, England, in 1835; died June 3, 1895. She was the daughter of Rev. Ferdinand Faithful, and received a fair education at a school in Kensington. In 1860 she established a typographical business in London for women compositors, with the approval of Queen Victoria, which was called The Victoria Press. She founded the *Victoria Magazine* in 1863, in which the wider recognition of women in public affairs was advocated. Soon after she went upon the lecture platform and addressed many literary and philosophical societies in behalf of the improvement of the condition of working women. She visited Canada and the United States three times to study the industries employing women and the religious aspect, particularly the practices of the Mormon Church. Queen Victoria made her publisher in ordinary to her majesty and granted her a pension of $250. She visited the Queen of Rumania in 1890 at the request of Victoria, for the purpose of recounting the opportunities for the employment of women in England. Among her publications are "Victoria Regia," "Change upon Change," "Three Visits to America," "Drawbacks Connected with the Employment of Women," and "Original Contributions in Prose and Poetry."

FAKIR (fā'kēr), a Mohammedan religious mendicant who wanders from place to place. A fakir is regarded by the common classes of Mohammedans as a character of sanctity, though fakirs are of the lowest priesthood. The term is applied by some writers to the Anglo-Indian and the Hindu mendicants, but the latter are more properly called *Gosavee.* In some regions of the Mohammedan countries they live in communities, but usually the life is solitary. Their attire is coarse and generally black or brown, while the headwear consists of a black turban, over which is tied a red handkerchief. To gain the veneration of the lower classes, they often mutilate their persons and practice absurd penance.

FALCON (fạ'k'n), a long-winged, high-couraged, raptorial bird, which takes its prey as it moves in the air. Technically, in falconry, the female alone is termed a falcon, the male, which is smaller and less courageous, being known as a *tiercel* or *tiercelet.* Naturalists generally apply the name falcon to various birds of prey, which they separate into distinct groups, including the *peregrine falcon, northern falcon, desert falcon, merlin,* and *hobby.* For symmetry, strength, and power of flight the falcon is the most perfect of the feathered race. The beak is strong and short-hooked at the point, the upper mandible having a notch or tooth on its cutting edge. In all species the legs are heavy and stout, the claws are sharp and long, and the wings are powerful. The average length of falcons is about two feet. The peregrine is most commonly used in falconry and is exceedingly swift, its flight being fully 65 miles per hour.



NORTHERN FALCON.

FALCONRY (fạ'k'n-rў), or **Hawking,** the pursuit of game by means of falcons or hawks. In ancient times the sport was called hawking, when the hawk was employed, but later the peregrine and other falcons became popular. The history of this pastime has been traced back to a period prior to the Christian era. At one time, in Germany, even kings and nobles devoted the greater portion of the hunting season to it. After the Norman Conquest, England indulged in the sport until the rank of the individual was indicated by the particular species of hawk carried on his gloved hand or wrist. Later it went largely out of fashion, but at present an attempt is being made to restore this sport, which is attended with growing success. The training of hawks is a matter requiring much care and patience. They are usually taken while young and hooded with a piece of leather, leaving an aperture for the beak, and are trained to sit on the hand and to eat from the lure. The lure is a device made of a piece of wood or leather covered with the wings and feathers of a bird and attached to a cord, to which a piece of meat is fastened. The fal-

coner swings the baited lure round and round his head, accompanying the action by some call. When the falcon has been taught to obey the lure, it is trained to catch live birds, and soon learns to seize the game. The hood is kept on the falcon during hunting excursions, until the bird is wanted to fly.



HOODED FALCON.
(ready for use)

FALK (fälk), **Paul Ludwig Adalbert,** jurist and statesman, born in Silesia, Germany, Aug. 10, 1827; died July 7, 1900. He was educated at the University of Breslau, entered upon the practice of law in 1847, and became counselor of the court of appeals at Glogau in 1862. When the North German Confederation was formed, in 1867, he was elected a representative. The following year he was appointed privy counselor to the minister of justice, in which capacity he aided in codifying the laws of the German Empire. In 1872 he became minister of public worship and instruction, and, when Prince Bismarck decided to curtail the privileges of certain church worship, he brought forward the repressive measures known as the May Laws. When negotiations for the restoration of harmony between the state and church were begun in 1879, he retired from office, accepting at the same time a peerage for his son. He was appointed to the presidency of the court of Hamm in 1892.

FALKLAND ISLANDS (fąk'lạnd), a group of islands belonging to Great Britain, situated in the South Atlantic Ocean, about 295 miles east of the Strait of Magellan. The total number of islands is about one hundred, with an area of 6,490 square miles, of which the two larger are East Falkland and West Falkland, containing respectively 3,000 and 2,300 square miles. The surface is hilly, with bogs extending from various points on the shore toward the interior region. Forest trees are entirely absent, but many grasses abound, on which herds of cattle and sheep are reared with much success, this constituting the principal industry. Many penguins and other sea fowls are native to the islands. The fisheries are valuable. The climate is healthful and well adapted to the production of cereals found in temperate climates.

The Falkland Islands were discovered by John Davis (1550-1605), Aug. 14, 1592, and were named by Captain Strong while cruising in 1689, in honor of Lord Falkland. Permanent settlements were first made by the French and later immigration followed by the Spaniards and English, the last mentioned securing permanent control in 1833. The principal exports are wool, hides, skins, and tallow. Machinery, wearing apparel, and building material are the chief imports. Local government is administered by direct appointees of the crown, and education is supported by government grants and local taxation. Stanley, on East Falkland, with a population of 916, is the capital. Population, 1916, 3,065.

FALLACY (făl'lă-sĭ), in logic, an invalid process of reasoning, which leads to an erroneous conclusion. Since fallacy is a violation of some logical law, many rules have been devised to govern sound reasoning and when one of these is violated the result is a logical fallacy. No agreement has been reached as to the proper classification, though the subject has been one for extended discussion from remote antiquity. Writers usually divide fallacies into three classes, assumptions, sophisms, and aberrancies.

An assumption is that which is taken as true without evidence. It may be true or false; but, resting on no basis of evidence, it is, in both cases, invalid, not because it is known to be false, but because it is not known to be true. To assume an assumption false, because of its lack of evidence, would be a procedure as invalid as to assume it true. Assumptions arise from want of attention, superstition, prejudice, hasty generalization, and preconceived opinions.

A sophism is an invalid argument, and may be said to constitute a fallacy that is designed to deceive. It originated from the Sophists of ancient Greece, who doubtless cared little for truth or morality, and merely professed to teach how to make the worse appear the better reason. Sophistry is a fallacious reasoning which is sound in appearance only and puzzles the inquirer after truth.

An aberrancy is a wandering from the conclusion warranted by the premises and drawing another which is unwarranted. One who infers the reasoning valid because the conclusion is true is misled by an aberrant fallacy, since it does not follow, because the conclusion is true, that the argument is valid. Many unsound arguments have escaped detection, because the conclusion of the speaker coincided with the opinions of the hearers. Again, one who infers that the conclusion is false because the premises are false, or the reasoning is illogical, is misled, since the proper inference is not that the conclusion is false, but that it is not proven.

FALLIÉRES (fȧ-lyâr'), **Clément Armand,** President of France, born at Mézin, France, Nov. 6, 1841. He studied in his native town and took up the practice of law, but went into politics. In 1876 he was elected to the Chamber of Deputies, where he soon distinguished himself, and was minister of the interior in 1882, 1883, and 1887. He was made minister of public instruction in 1883 and subsequently became minister of justice. In 1890 he was elected to the Senate, was reëlected in 1897, and in 1899 became president of the Senate. He was elected President of France in 1906 to succeed Loubet.

FALLING BODIES, a term used in physics when demonstrating the force of gravity. All terrestrial bodies, if unsupported, fall or move toward the earth's center by this force. That the acceleration due to gravity is the same for all masses was proved by Galileo. His experiments consisted in dropping unequal balls of iron from the top of the leaning tower of Pisa. He discovered that, whatever their masses, the balls reached the ground at the same instant. Using balls of iron and wax, he found that the iron balls struck the ground first. From this phenomenon he concluded that bodies less dense are similarly influenced by gravity, but that the unequal velocities are due to the resistance of the air acting on different extents of surface. It was later demonstrated by Newton that all bodies in a vacuum fall with the same velocity, which proves that the effect of gravitation on bodies is proportional to their masses, but the resistance of the air causes the apparent exception to the law.

In a body falling freely from a state of rest, the velocity at the end of the first second is equal to about 32.16 feet per second. At the end of the next second it is 32.16 times two, and equals 64.32 feet per second; at the end of the third second it is 144.72 feet, etc. If the time is known, the distance through which a falling body passes may be found by multiplying the square of the time in seconds by 16.08. Thus, in two seconds, 2x2x16.08=64.32. The acceleration varies in different parts of the earth's surface, being least at the Equator and increasing slightly with the latitude to a maximum at the poles.

The distances fallen by an unsupported body in successive seconds increase at the odd numbers. Thus, a body falling from a state of rest passes through 16.08 feet during the first second, and attains a velocity of 32.16 feet. During the next second it falls through 3x16.08 feet, or 48.24 feet, and the third second, 5x16.08 feet, or 80.40 feet. The total distance in feet through which a body falls in a given time is proportional to the square of the time, and is equal to the square of the time in seconds multiplied by 16.08. Thus, a falling body passes four times as far in two seconds as in one second and nine times as far in three seconds as in one second. In the first second a body falls 16.08 feet, and in the next second it falls 48.24 feet. At the end of the second second it has fallen through a total distance of 48.24+16.08=64.32 feet. Thus, 64.32 feet is four times 16.08 feet, or 2x2x16.08, as per the statement above.

FALLOW DEER (făl'lō), a species of deer native to Europe and Northern Africa. In a wild state it is found chiefly in the mountainous regions of the southern part of Europe, but it is very common in the parks and forest reservations. The male or buck has palmated antlers, about 25 inches long, and is somewhat larger than the female or doe, which is without horns. It has a brownish color, characterized by pale spots, and the hair is smooth and fine. The young fawn is mottled and accompanies the mother at an early age. Fallow deer go in herds under a master, an old buck, who keeps an outlook for danger and appears to command the herd. The flesh is highly esteemed for food.

FALLOW LAND, the name applied to ground which is left untilled in crops, but is plowed in the summer, as a means to regain productiveness after continuous cultivation. Such plowing is usually called summer fallow. All land, no matter how productive, if used continually for a number of seasons, becomes partly exhausted, and this method is employed to allow it to rest and recover its fertility. In other instances various forms of fertilizing are used for the same purpose. Strictly speaking, the land should remain idle the entire year, but the term is likewise applied to various modes of treatment, such as plowing the ground immediately after the removal of a spring crop, known as bastard fallow; or planting the ground with some crop that can be planted in rows, as corn or potatoes, which admits of the intermediate spaces being cleaned, stirred, and pulverized during the growth. The latter is known as green-crop fallow.

FALLOWS, Samuel, clergyman and educator, born in Pendleton, England, Dec. 13, 1835. When ten years of age, he came to the United States, graduated at the University of Wisconsin in 1859, and was elected vice president of Gale College, Galesville, Wis. The Methodist Church ordained him as minister in 1861. Soon after he entered the Union army as chaplain. Owing to his persistent courage he became known as the "fighting parson," attaining the rank of brevet brigadier general. Shortly after the war he accepted a pastorate in Milwaukee. In 1871 he was elected State superintendent of public instruction of Wisconsin, to which office he was twice reëlected. He became president of the Illinois Wesleyan University in 1874 and rector of the Saint Paul's Reformed Episcopal Church of Chicago in 1875, and the following year engaged as editor of the *Appeal.* He published a number of important educational works, including "Hand-

book of Synonyms," "Dictionary of Synonyms and Antonyms," "Handbook of Americanisms and Britainisms," and "Students' Bible Dictionary."

FALL RIVER, a city of Massachusetts, in Bristol County, on the Taunton River and Mount Hope Bay, an arm of Narragansett Bay, about fifty miles southwest of Boston. It is on the New York, New Haven and Hartford Railroad and many electric railway lines. The site is at the head of deep-water navigation, forming the terminus of steamships from New York and other ports. It is the greatest cotton goods manufacturing city in America, employing about 3,200,000 spindles. The products include calico, yarn, gingham, and thread. Calico printing and the dyeing of cotton goods are extensive enterprises. Other manufactures include nails, boots and shoes, soap, rope, carriages, and granite quarry products.

Fall River is a modern and regularly platted city. The streets are well graded, lighted, and paved with stone and macadam. Among the public buildings are the city hall, the United States customhouse and post office building, the State armory, and the public library. Other buildings of note include the Mount Hope School, the Fall River Conservatory of Music, the Notre Dame College, the Union Hospital, and the Boys' Club. In 1887 the Durfee high school building was donated to the city. It is a fine structure of granite and is well equipped with apparatus for teaching the sciences. Fall River was a part of Freetown until 1803, when it was incorporated under its present name. In 1804 it was named Troy, but the present name was restored in 1834. The growth of the city is due largely to an abundance of water power obtained from Fall River, the outlet of Watuppa Lake, which is located on the eastern border of the corporation. Population, 1905, 105,697; in 1910, 119,295.

FALSE IMPRISONMENT, the unlawful restraint of one's liberty by detention without authority of law. The false imprisonment of a person is a crime, whether the detention is in a prison, police station, or a private house, even if confined without bars or bolts, and a person guilty of the offense is liable to prosecution as well as reparation to the party injured. However, several exceptions are made, such as detaining a madman or persons who are known to have committed a crime. Other exceptions are those made in favor of parents, guardians, and teachers, who restrain children under their authority within reasonable limits.

FALSE PRETENSES, in law, the willful misrepresentations of fact to obtain money or other property of value. Any person who is guilty of obtaining a valuable consideration in this way may be punished by fine or imprisonment or both. However, the pretenses must relate to a fact or state of facts which are represented as existing at the time or already passed. Representation or promises as to what a party will do or what facts will occur in the future, no matter how false or groundless, are not considered misdemeanors. Besides, the party claiming to be defrauded by a false pretense must have relied upon the representations as true.

FALSETTO (fal-sĕt'tō), in music, the artificial tone of the voice. The voice contains three registers—chest voice, head voice, and a third, which is not natural, and is called falsetto or false voice. It is usually blended, by practice, with the chest voice so as to make no perceivable break.

FAMILY COMPACT, the name of an alliance concluded between France and Spain in 1761. It was designed to unite all the branches of the house of Bourbon as a counterpoise to the maritime ascendency of England. By its terms the American colonies secured the aid of Charles III. of Spain, and Pitt proposed to declare war against that country, but he was outvoted and resigned.

FAMINE (făm'ĭn), a widespread and distressing scarcity of food, usually resulting from drought, war, flood, or insects. Tropical climates subject to irregular rainfalls are most commonly affected by famines, though defective economic systems, such as the absence of articles of food and imperfect means of transportation, are prolific causes. In the Middle Ages famines were more numerous than at present for the reason that modern communication and transportation makes it possible to supply quite successfully the districts in want with the necessary means of sustenance. The most widespread famines of recent times have been experienced in Asiatic countries, particularly in India and China. The great famine visiting northwestern India in 1837-38 caused 800,000 persons to perish, and the one occurring in Bengal and Orissa in 1865-66 resulted in about a million deaths. In 1847 a famine visited Bengal, but it was not excessively destructive of human life for the reason that supplies were transported rapidly to the afflicted districts, though nearly a half million died during the great famine in 1877, which visited Bombay, Mysore, and Madras. It is estimated that 9,000,000 persons perished at the time of the great famine in China in 1877-78, while the one in 1888-89, caused by the overflow of the Yellow River, was equally destructive. One of the most remarkable famines of India occurred in 1897, which was followed by a very destructive and widespread dearth of food in 1900. The most destructive famine of recent times visited China in 1902, when about a million people died of starvation.

FAN, an instrument for agitating the air by the movement of a flat surface, especially for cooling the face or causing the movement of air in a room. Devices for cooling the face by agitating the air were in use among the Greeks and Romans, and were introduced into

western European countries shortly after the Roman invasion of Gaul and Germany. Those generally used are made of palm leaves, feathers, thin skin, wood, paper, or ivory, and are of various construction. Ventilating fans are propelled by steam or electric power. Those of the latter class have a simple motor with alternating electric currents, a fifty-volt transformer current usually being sufficient to propel the fan. These ventilating fans are frequently seen in department stores, offices, and dining rooms, where currents of air are put in motion for the cooling effects. In mining, for winnowing grain, urging combustion, cooling fluids, and other purposes contrivances of flat disks or waves are utilized, which, when propelled by machinery, revolve rapidly and induce strong currents, the force of the current depending upon the velocity at which the fan moves. See **Blowing Machine.**

FANATICISM (fā-năt'ĭ-sĭz'm), the term used to designate intemperate zeal or ferocious enthusiasm. The spirit of fanaticism has frequently characterized political and religious movements, in which advocates of reforms were unduly enthusiastic, and often resorted to radical measures in endeavoring to further their ends.

FANCY (făn'sy), in psychology, a term used in connection with imagination, of which it is a form. When the imagination combines the subjects it uses in such a way as to give a result that is pleasing, light, and playful, but still shows nothing of high purpose or of noble and cultivated taste, it is called fancy. Images of the fancy are dealt with by many of the poets and orators. The comparison made by Longfellow, in which the moon is likened to the paper kite of a school boy, is a mere fancy. In early life the imagination inclines more commonly to the fanciful. This is evidenced by the productions of great writers, particularly of Shakespeare, whose early writings partake more of the fancy than do his later productions.

FANDANGO (făn-dăŋ'gō), a famous dance of the Spanish people, dating from the Moorish occupation of Andalusia, though it is rarely danced, except at theaters and in parties given by the lower classes. It is said to have come into favor on account of the ecclesiastical authorities in Spain threatening to prohibit dancing. Accordingly, two parties were brought before the judges of a court, in which the fandango dance was given, and this resulted in its approval. In this form of dancing the parties never touch each other, but retreat, approach, and pursue each other in varied movements, voluptuousness being indicated by the movements.

FANEUIL (fŭn'ĕl), **Peter,** merchant, born in New Rochelle, N. Y., in 1700; died March 3, 1743. He descended from a family of French Huguenots. His parents removed to Boston, where he became the head of a successful mercantile business. In 1742 he erected a public market at his own cost and gave it to the city. The building was destroyed by fire in 1761, but was rebuilt by public taxation in 1763 and was used as a theater in 1775. At the time of the Revolution the Americans selected it for a meeting place, from which it came to be called *the cradle of liberty,* and those taking part in the meetings were known as *Sons of Liberty.* Faneuil Hall was remodeled in 1805 and one story was added. The main hall is eighty feet square. Pictures of distinguished Americans decorate its walls.

FAN PALM. See **Palms.**

FARADAY (făr'a-dā), **Michael,** distinguished chemist and philosopher, born at Newington Butts, near London, England, Sept. 22, 1791; died Aug. 25, 1867. He was the son of a blacksmith, was apprenticed to a bookbinder when thirteen years old, and showed a very early aptitude for the study of science and electric machinery. When Sir Humphry Davy lectured on chemistry at London, in 1812, he obtained admission, and was soon after appointed assistant at the Royal Institute. He succeeded Davy to the chair of chemistry in 1827, and five years later was created a doctor of civil law. His valuable researches were carefully noted and much useful information regarding them was afterward published in various works which are still held in high repute. The notable discoveries made by him include new compounds of carbon and chlorine, compounds of carbon and hydrogen, and numerous alloys of steel. In 1829-30 he made a series of experiments in the manufacture of glass for optical purposes. Later he experimented successfully in magnetism and electricity, which resulted in several useful discoveries. Oxford conferred upon him an honorary degree in 1832 and the academy at Berlin, Germany, made him an honorary member. Lord Melbourne granted him a pension of $1,500 a year, beginning in 1835, and a house at Hampton Court was given him in 1858. Among the most valuable works published by him are "Lectures on the Forces of Matter," "Researches in Electricity," "Chemical History of the Candle," "Non-Metallic Elements," and "Chemical Manipulation."

FARALLONES (făr-răl-lōnz'), an island group off the coast of California, situated thirty miles west of the Bay of San Francisco. It belongs to the State of California. The group consists of six islands, on the largest and most southern of which is a lighthouse with a flash light of the first order, at an elevation of 360 feet above sea level. Great numbers of gulls and murres breed on these islands and furnish vast quantities of eggs, which are gathered for the market of San Francisco. Many sea lions and several species of seals frequent the group.

FARCE. See **Drama.**

FAR EASTERN QUESTION, the problem of international politics which at present

is receiving attention from the leading nations of the world. In respect to territory it refers to Farther Asia, which in this sense includes all of the eastern portion of that grand division. It may be said that this issue of international politics dates from the time Prince Henry the Navigator explored an eastward route to the Indies, since which time the leading European powers have sought to control both the territory and commerce of the Orient. However, the beginning of the 20th century intensified interest in Far Eastern politics, particularly since the means of navigation have been improved and railroad building has become greatly extended, by which changed conditions western people have been enabled to compete more successfully in the Asiatic market.

The rise of Japan as a political power is a potent factor in the Far Eastern Question, and the war between Japan and China in 1894-95 is the beginning of an important epoch. The United States became more directly interested by annexing the Philippines in 1898, though it had already established itself as a factor by the annexation of the Hawaiian Islands. The policy of the United States has been to advocate the preservation of the integrity of China, and it has insisted that all nations, irrespective of spheres of influence, be granted equal rights of trade in the Chinese Empire. Russia has long sought preponderance in Manchuria, principally because the control of that region is an essential in securing a broad outlet to the Pacific for the great Siberian railway system. However, Russian influence became greatly lessened through the fortunes of war with Japan, and the latter country is not only a claimant to consideration, but is destined to exercise a wide influence in forming the future policy in regard to China and its industrial development. Germany, Great Britain, and France are the other three powers most concerned, since each has a foothold on the eastern shore of Asia. The trade of Shan-tung and the fertile valley of the Yellow River are largely in the hands of Germany, while Great Britain is strengthening her position in the Yangtze valley, and France is endeavoring to cross China with a railway line from French Indo-China to connect with the Trans-Siberian Railway in Russian or Japanese territory.

In 1900 occurred the Boxer outbreak against foreigners, which was designed to preserve China for the Chinese. The promoters of this movement look upon railroad building as particularly favorable to the nations that advocate establishing spheres of influence until all of China is controlled by the commercial nations of Europe and America. No doubt the whole question will turn upon railroad building, and already transcontinental lines have been projected both north and south. When completed these lines will carry a vast trade and furnish the means which will bring Europe into control, as well as open and maintain a wide market for the manufactures produced by modern methods.

FAREL (fä-rĕl'), **Guillaume,** eminent reformer, born in Gap, in Dauphiné, France, in 1489; died in Neuchâtel, Switzerland, Sept. 13, 1565. It was the wish of his parents that he should engage in a military career, but he chose to pursue the calling of the ministry, and accordingly obtained admission to the University of Paris. He first supported the Roman Catholic Church with marked devotion, but afterward became converted to the reformed faith, and labored with much zeal to spread the new doctrine in Switzerland. His success was most marked in Basel, Berne, and Geneva, where he secured a large following by reason of powerful sermons. The work of Farel had a marked influence on the life of Calvin, Erasmus, and Faber.

FARGO (fär'gō), a city of North Dakota, county seat of Cass County, on the Red River of the North, opposite Moorhead, Minnesota. It is on the Great Northern, the Northern Pacific, and the Chicago, Milwaukee and Saint Paul railroads. The surrounding country is a fertile region, producing large quantities of hay, wheat, flax, oats, and other cereals. Among the noteworthy buildings are the post office, the county courthouse, the public library, the public high school, and the Protestant Episcopal and Roman Catholic cathedrals. It is the seat of Fargo College (Congregational) and of the State Agricultural College. Island and Woodland parks are public resorts. The chief manufactures include flour, clothing, brick, and machinery. It has a large retail and jobbing trade in merchandise. Electric lights, sewerage, pavements, and public waterworks are among the improvements. It was settled in 1871 and incorporated in 1875. Population, 1910, 14,331.

FARGUS, Frederick John, known as Hugh Conway, novelist, born in Bristol, England, in 1847; died May 15, 1885. He was the son of an auctioneer and joined the navy, and adopted his pseudonym from the *Conway,* a ship stationed in the Mersey. In 1884 he published a novel entitled "Called Back," which had a wide sale and was dramatized by Comyns Carr. Other writings include "A Cardinal Sin," "Living or Dead," "Life's Idylls," and "Slings and Arrows."

FARIBAULT (fâr'ĭ-bō), county seat of Rice County, Minnesota, at the confluence of the Cannon and Straight rivers, 52 miles south of Saint Paul. It is on the Rock Island, the Chicago Great Western, the Chicago, Milwaukee and Saint Paul, and other railroads. The surrounding country is fertile and contains many productive farms and dairying establishments. Among the manufactures are woolen goods, clothing, machinery, and cigars. The noteworthy buildings include the county courthouse, the high school, the State institutions for the deaf, dumb, and feeble-minded, the Bethlehem Acad-

emy for girls, the Seabury Divinity College, the Shattuck School for boys, and Saint Mary's School for girls. It has electric lights, pavements, waterworks, and street railways. The principal manufactures are flour, woolen goods, musical instruments, clothing and machinery. It was settled in 1850 and incorporated in 1877. Population, 1905, 8,279; in 1910, 9,001.

FARINELLI (fä-rē-nĕl'lē), **Carlo,** celebrated singer, born in Naples, Italy, Jan. 24, 1705; died in Bologna, July 15, 1782. His voice was developed early in life and showed such a degree of culture that he became a favorite singer among the European monarchs of his time. Philip V. bestowed marked honors upon him, granting him special privileges at the court of Spain, and he was similarly honored by Ferdinand VI.

FARINI (fä-rē'nē), **Luigi Carlo,** statesman and historian, born at Russi, Italy, Oct. 20, 1812; died Aug. 1, 1866. He studied medicine at the University of Bologna and began to practice, but was proscribed for political offenses in 1843. The amnesty proclaimed in 1846 permitted him to return, and soon after he became a prominent factor in political affairs. In 1859 he was made dictator of Modena by Napoleon III., and afterward served in the cabinet of Cavour, whom he aided in promoting the movement for a liberal government. He supported the union of the Italian states under Victor Emmanuel. Monuments were erected to his honor at Turin and Ravenna. He is the author of a history entitled "The Roman State from 1814 to 1850."

FARJEON (fär'jŭn), **Benjamin Leopold,** novelist, born in London, England, May 12, 1833; died in 1903. He descended from Jewish parents and went to New Zealand and Australia in search of his fortune. In 1869 he returned to England and took up the work of a dramatist. His numerous novels deal largely with people in low life, from which fact he has been compared to Dickens. Among his writings are "Blade-o'-Grass," "The House of White Shadows," "London's Heart," "A Fair Jewess," and "The Duchess of Rosemary Lane."

FARLEY, John Murphy, cardinal, born in Newton Hamilton, Ireland, April 20, 1842. He began to study for the church in Ireland, but came to America and attended the provincial seminary at Troy, N. Y. Subsequently he studied at the American College in Rome, Italy, where he was ordained a priest in 1870. In the same year he was made assistant rector in Staten Island, but his ability as an organizer was soon recognized, hence he was recalled to Rome and made private chamberlain to Leo XIII. In 1891 he was appointed vicar-general of the archdiocese of New York, in 1902 became Archbishop of New York, and in 1911 was appointed cardinal. His publications include "Life of Cardinal McCloskey" and "Why Church Property Should Not Be Taxed."

FARMERS' INSTITUTE (ĭn'stĭ-tūt), the organization maintained for the purpose of providing opportunities for discussion and advancement of agriculturists and stock raisers. The plans under which farmers' institutes are organized differ somewhat. In some instances they are conducted under the direction of officials appointed by a board of agriculture, while in others the state or government makes an annual appropriation, by means of which institute meetings may be organized and maintained throughout the agricultural districts. The course of study pursued includes topics relating to improved methods of cultivation, fertilization, care of machinery, stock raising, wool, mutton, and pork productions, transportation to market, beautifying of farm life, and many other kindred subjects. It is usually customary to have experienced professors of agriculture and mechanic arts give a series of lectures in order to bring the practical experience of the central stations in direct contact with the practical cultivators of the soil, the rearers of domestic animals, the workers in dairy establishments, horticulturists, etc. In some instances the institutes are in session for several weeks consecutively, while in others local meetings are held at various points in the county or district, thereby facilitating the attendance of a larger per cent. of the industrial classes.

In some instances, as in Michigan and several other states, the institutes are under the control of a board of agriculture. The state appropriation to defray the expenses of the institutes in New York aggregates annually about $15,000, while in Iowa the appropriation to each county may not exceed $50 per annum. Other states have plans whereby the same object may be attained, though the methods are very much diversified. Similar provisions have been made in Canada. The institute movement has progressed most successfully in the states of the north and northwest and in Ontario and the western provinces of Canada.

FARMERS' ORGANIZATIONS (ôr-gạn-ĭ-zā'shŭns), the societies or parties organized by farmers for the purpose of bettering the condition of agriculturists, and influencing legislation favorable to the various lines of agriculture, horticulture, floriculture, stock raising, and dairying. Among the first organizations of this kind was the Patrons of Husbandry, organized by William Saunders, Aug. 5, 1867. This was formed on the plan of fraternal societies, under which certain degrees were given to members. The subordinate lodges or granges organized under the system were governed by the National Grange and numbered about 26,000 in 1890. Later other organizations were formed, having a more or less political significance, among them the National Agricultural Wheel, the National Farmers' Alliance, and the National Farmers' Political League. In 1892 a convention of delegates from the various farmers' organizations, together with delegates of the Knights of Labor

and the People's party, was held in Omaha, Neb. A platform declaring their principles was adopted on the Fourth of July. Among the tenets declared were those of a graduated income tax, free coinage of gold and silver, government ownership of telephones and telegraph lines, reclamation of lands from aliens, and the eight-hour labor law. Gen. J. B. Weaver, of Iowa, was nominated for President and Gen. James Field, of Virginia, for Vice President. The party organized in this way received 1,055,424 of the popular and 22 of the electoral votes.

FARNE ISLANDS (färn), or **Fern Isles,** a group of islands in the North Sea, off the east coast of England, opposite Northumberland. The group includes seventeen islets of rocky formation. Navigation in the vicinity is very dangerous. They were the scene of the heroic deeds of Grace Darling in 1838, when the *Forfarshire* was lost. A tower built to the memory of Saint Cuthbert is on one of the islands. They belong to Great Britain.

FARNESE (fär-nēz'), noted family of Italy that gave many eminent names to the republic of Florence and to the church. It descended from the early part of the 13th century and several branches of it still remain. Among the famous works of art found at Naples are several associated with the Farnese family, among them "Farnese Hercules," "Farnese Bull," and "Farnese Flora." The name of this family was given to the Farnese Palace at Rome, an edifice erected by Pope Paul III., which was designed by Antonio da Sangallo and completed by Michael Angelo. It was formerly the property of the Farnese family, but afterward passed to the ruling dynasty of Naples.

FAROE ISLANDS (fā'rō), a group of 25 islands situated in the North Atlantic, between Iceland and the Shetland Islands. The coast lines are largely rugged cliffs, rising abruptly to a height of 500 to 2,000 feet, while the mountains of the interior contain extensive tablelands, none of which exceeds 3,000 feet above the sea level. These islands belong to Denmark. They are governed by resident representatives appointed under the direction of the king. The inhabitants are descendants of Scandinavian people who settled here largely in the 9th century. Strömö is the largest island and contains the capital, Thorshavn, which has a population of about 1,000. The islands are treeless, but have valuable deposits of peat and coal. Building material and machinery are imported largely from Norway. The chief industries of the people consist of fishing, hunting, and sheep culture. Only seventeen of the islands are inhabited. The religion is exclusively Lutheran. Numerous schools are supported by government grants. Population, 1916, 15,821.

FARRAGUT (făr'ă-gŭt), **David Glasgow,** famous naval commander, born near Knoxville, Tenn., July 5, 1801; died in Portsmouth, N. H., Aug. 14, 1870. He entered the navy as midshipman at the age of nine years, was promoted to a lieutenancy in 1821, and in 1851 secured an appointment as assistant inspector of ordnance. The long period of peace gave him little opportunity to distinguish himself as an officer, though he received a commission as captain in 1855. At the outbreak of the Civil War he was assigned to accompany an expedition against New Orleans and with it set sail in February, 1862. After shelling the city without effect for a week, he succeeded in forcing a passage of the river in the dark on April 25, which caused it to fall and pass into the hands of the Federals under General Butler. Later Farragut took possession of Baton Rouge and Natchez, ran the batteries at Vicksburg, and joined the Union fleet above. He was made rear admiral on account of his success at New Orleans. On Aug. 5, 1864, he attacked the Confederate fleet in the Bay of Mobile and compelled it to surrender, and thereby closed the port of Mobile by a successful blockade. The oversight of the contest was made by Farragut while lashed to the mast of his flagship, the *Hartford,* which is known as one of the most interesting episodes of the war. In 1866 Congress created him a vice admiral, and two years later raised him to the rank of admiral, a rank that had not existed in the United States navy prior to that time. His memory is fittingly commemorated by bronze statues in Washington and New York.



DAVID G. FARRAGUT.

FARRAR (făr'rär), **Frederick William,** noted clergyman, born in Bombay, India, Aug. 7, 1831; died March 22, 1903. He was educated at King's College, London, and later became a scholar and fellow of Trinity College, Cambridge. While at the latter institution, several university honors were bestowed upon him, among them the chancellor's prize for English verse. In 1854 he became a deacon of the English Church, and was admitted into the priests' order three years later. For five years he held with distinction the head mastership of Marlborough College, in 1876 was appointed rector of Saint Margaret's, London, and in 1883 became Archdeacon of Westminster. As a writer he was as preëminent as in preaching the gospel, and gave to the world several excellent works on religious and moral philosophy, the most important being the "Life of Christ," which appeared in many editions and has been translated into various languages. Among his other productions are "The Wit-

ness of History to Christ," "Life of Saint Paul," "The Early Days of Christianity," "The Eternal Hope," "Messages of Books," "Darkness and Dawn," and "The Fall of Man." He published a number of works of an educational character, among them "Greek Grammar Rules," "Families of Speech," and "Essays on Liberal Education."

FARTHING (fär'thĭng), a coin of Great Britain, the fourth part of a penny. It was first coined by the Saxons, but the copper farthing did not come into use until 1665. A farthing is equal to about one-half a cent in the money of Canada and the United States.

FARWELL, Charles Benjamin, public man, born in the State of New York, July 21, 1823; died in 1903. He removed to Illinois in 1838, was clerk of Cook County a number of years, and in 1861 joined his brother in establishing a prosperous wholesale dry goods business. In 1870 he was elected to Congress as a Republican and was reëlected in 1872 and in 1874. He succeeded John A. Logan as United States Senator in 1887.

FASCINATION (făs-sĭ-nā'shŭn), any irresistable influence which captures or controls the will or intellect. That human beings are fascinated more or less easily by certain natural influences is admitted on every hand, but some go so far as to seek to revive widespread belief in the evil eye, an influence that the superstitious thought existed, and by which individuals could be compelled to act contrary to their wishes. Some naturalists think that certain snakes and other animals have this power over mice, squirrels, and birds, but it has been neither satisfactorily explained nor demonstrated. However, some think that serpents emit narcotic fluids whereby the weaker animals become stupefied, while others regard the force or influence analogous to hypnotism.

FASHION (făsh'ŭn), the prevailing style of usages, ornaments, and dress which is adopted by society and accepted by its members in accord with a general law of interest. The fashions change from time to time. They are supposed to take form in line with the most serviceable in practice and the most elegant and decorous in design. When the various fashions of past ages are examined, it is found that the changes were rapid and marked, and that caprice was more often the cause than utilitarian motives. However, the desire to dress *in fashion,* to have every part of the apparel agree with the accepted style, is noticeable throughout the period of history.

FASHODA (fà-shō'dà), a town of the Egyptian Sudan, on the White Nile. It was occupied by the French under Captain Marchand in 1898. The British demanded its evacuation, but the French refused to comply with this demand until they themselves received commercial concessions in the region of the upper Nile and an approval to the extension of their possessions in the Central Sudan. Fashoda was founded by the government of Egypt in 1867 and is situated in an unhealthful region. It lost its importance after 1898 and was renamed Kodok.

FAST (fâst), the voluntary abstention from food, a practice which originated as a religious discipline. It may be either a total abstinence for a brief time from all food, or only from certain kinds, as meat or leavened bread. The origin of the practice is very obscure, but it probably did not at first occupy nearly so prominent a place in Christian rituals as that to which it afterward attained. Among the ancient Egyptians fasting seems to have been associated with many religious festivals, notably that of Isis, but it was not compulsory. Among the Jews fasts were numerous, but the day of atonement was the only fasting day enjoined by the law of Moses. Mishna speaks of four others commemorating, respectively, the storming of Jerusalem by Nebuchadnezzar, the burning of the temple by Titus, the sacking of Jerusalem by Nebuchadnezzar, and the reception of the news of the destruction of Jerusalem by Ezekiel and other captives. Other fasts were proclaimed by royal or other authority on special occasions.

The New Testament enjoins no stated fasts, but several came into vogue subsequently, the fast of Lent taking the lead. In the 3rd century the Latins fasted on the seventh day. The Council of Mentz, in 813 A. D., ordered a fast the first week in March, the second week in June, the third week in September, and the last full week preceding Christmas. In the Roman Catholic Church there is a distinction between the days of fasting and of abstinence. The principal fast days of that church are the forty days of Lent, All Saints, the Immaculate Conception, Rogation Days, Assumption of the Virgin, Whitsuntide, and the eves or vigils before certain festivals, as before Christmas day. To these are to be added the Ember Days, these being the Wednesday, Friday, and Saturday after the first Sunday in Lent, Whitsuntide, the 14th of September, and the 13th of December. Abstinence is practiced on every Friday.

The Greek Church observes as fast days Wednesdays and Fridays; Easter, 48 days; Christmas, 39 days; and several others. The Episcopal and Anglican churches recognize the fast as being praiseworthy, but give no directions concerning it. Their fasting days are every Friday, except Christmas day; the 40 days of Lent; the three rogation days before Holy Thursday; and the Ember Days at four seasons. The Protestant churches in general do not observe fast days, but uniformly require moderation in eating and drinking wholesome food. However, some denominations, as the Adventists, abstain from certain foods, such as the flesh of swine.

FAT, an animal substance of a more or less oily character deposited in vesicles in the

adipose tissue. It is a compound of oxygen, hydrogen, and carbon, and occurs mainly under the skin and on the surface of muscles, but also collects in considerable quantities around certain organs, as the heart and kidneys. Fat surrounds the joints and is found in large quantities in the marrow of the bones. Being light, soft and elastic, it forms an excellent packing material in the body, giving a rounded contour and smooth surface to the frame. Its chief use is for the purpose of nutrition, but, not being a good conductor of heat, it enables the body to retain a reasonable uniformity in temperature. In extremely cold climates fat is the principal food of man; for instance, the Eskimos subsist almost wholly on the fat of bears, seals, and whales during the season of extreme cold. *Fatty degeneration* is an abnormal condition brought on by defective nutrition or excessive use of alcohol, on account of which fatty granules take the place of healthy protoplasm in the heart, kidneys, muscles, and arteries. The sufferer retains the appearance of health, but is impaired by want of energy and muscular weakness.

FATALISM (fā'tạl-ĭz'm), the doctrine of an unchangeable destiny, according to which all things are preëstablished by the Creator, or by the fixed laws of nature. It has given rise in theory to doctrines or predestination, and, in moral science, to such systems as those of Hegel and Spencer. The ancient Greeks held to the belief in fate so strongly that they regarded it the controlling power of even the gods, while in modern times the Mohammedans regard all things predestined or decreed by fate, and consider the occurrence of an accident an impossibility.

FATA MORGANA (fā'tà môr-gā'nà), a peculiar kind of mirage seen in Italy, especially between the coasts of Calabria and Sicily. It occurs in still mornings, when the waters are unruffled by breezes or currents, and the rising sun shines down upon the smooth surface at an angle of 45°. Objects upon the opposite shore of Sicily, upon the dark background of the mountains of Messina, are seen refracted and reflected upon the water in mid-channel, representing large and duplicated images. Gigantic figures of men and horses move over the picture, interspersed with trees, castles, and palaces. Anciently it was supposed that the phenomenon is due to the fairy Morgana, hence the name.

FATES, in Greek mythology, the deities supposed to preside over the birth, life, and fortunes of man. They were three in number—Clotho, Lachesis, and Atropos. Clotho held the spindle, Lachesis drew out the thread of man's destiny, and Atropos cut it off. The three were regarded as the regulators of the duration of human existence and the destinies of mortals, and places were consecrated to them in Corinth, Sparta, Olympia, Thebes, and other parts of Greece. In statuary they are represented both as young women and as matrons.

FATIGUE, the weariness which follows a long sustained application of the body or mind. It is a lassitude or exhaustion of strength which is due to continued bodily labor or mental exertion. A reasonable amount of fatigue is beneficial to both the body and mind, since it operates to increase the power of the muscular and nervous tissues, thus giving a larger measure of strength and providing for greater future capability. However, the young and those who have a weak constitution need to exercise care in practicing sustained exertion, since it may have the effect of overtaxing certain muscles or nerves. Excessive muscular fatigue is followed by a loss of the contractile power of the muscle. In the nerves and brain it causes shrinkage of the nerves and a loss of sensibility and mental power.

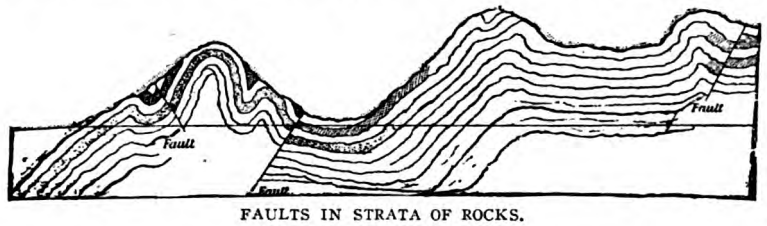
The term *fatigue of materials* is applied to the injury which results from stresses that exceed the elastic limit of materials. If a bar of wrought iron has an ultimate strength of 55,000 pounds per square inch, in which the elastic limit is 25,000 pounds, a single application of a load will not cause a rupture until the ultimate limit of strength is reached. However, when the application exceeds 25,000 pounds per square inch, the molecular structure is altered, causing the iron to become brittle, and a rupture may occur under a stress much less than its ultimate strength, perhaps at 35,000 pounds per square inch. Engineers have formulated elaborate rules governing the fatigue of materials and make allowance for repeated stresses by means of definite formulas. See **Strength of Materials.**

FATIMITES (făt'ĭ-mīts), the descendants of Fatima, the daughter of Mohammed. They constituted a powerful dynasty which ruled Egypt and Syria for more than two centuries, at the time the Abbasside caliphs reigned at Bagdad. They claimed as their founder Ismael, one of the imams who descended from Ali and Fatima, and attained the throne under Adu Mohammed Obeidallah, who became the ruler in 909 A. D. The dynasty was extinguished in 1171, on the death of Adhed, the fourteenth caliph. It was succeeded by a new dynasty established by Saladin the Great.

FATTY DEGENERATION (dĕ-jĕn-ĕr-ā'-shŭn), in pathology, a term which signifies a gradual displacement of the healthy protoplasm by fat globules. These globules have no element essential in life, hence are destructive to the living tissues. They are liable to affect any of the tissues, especially the cellular and muscular, and are a frequent cause of diseases of the heart and liver. Fatty degeneration of the kidneys occurs in many cases of Bright's disease. It is more common in old age, likely due to defective nutrition, and requires careful medical treatment.

FAUBOURG (fō-bōōr'), the name applied in France to the suburb of a city, or to a district recently annexed to the municipality. Saint Germaine, a fashionable quarter of Paris, is a faubourg of that city.

FAULT, in geology, a displacement of strata of rocks along a plane of fracture. Faults are frequently met with in working beds of coal, the miner coming unexpectedly against an abrupt wall of other strata. The angle this makes in a plane of the bed he is working indicates whether he must look up or down for its continuation on the other side of the dislocation. Beds are thus heaved from a few feet to several hundred or even a thousand feet.



FAULTS IN STRATA OF ROCKS.

FAUNS (fąnz), in mythology, the rural deities who descended from Faunus, King of Latimus. In poetry they are described as creatures with horns, having the figure of a goat below the waist, but being gayer and less hideous than the satyrs. They dwelt in the hills and woods, or were associated with the life on the farm. The fauns are mentioned in the writings of many Roman authors, who associated them chiefly with comic and fantastic scenery.

FAURE (fōr), **François Félix,** president of France, born in Paris, Jan. 30, 1841; died Feb. 16, 1899. He became a shipowner of Havre and served as president of the chamber of commerce of that city. In the Franco-Prussian War of 1870-71 he distinguished himself, and later assisted in putting down the Commune, receiving as a mark of distinction the ribbon of the Legion of Honor. In 1881 he was elected to the Chamber of Deputies as a Republican, and became undersecretary of state, which position he held until 1882. He was chosen a representative in the Brisson cabinet in 1885, became undersecretary of state a second time in 1887, and was made vice president of the chamber in 1894. On the resignation of Casimir-Perier in 1895, he was elected president, receiving 430 votes, while 361 were cast for Brisson. An unsuccessful attempt to assassinate him was made on July 14, 1896. He is author of "Budget of France" and "Principal Countries of Europe since 1888."

FAUST (foust), or **Fust, Johann,** famous printer, born in Mentz, Germany, about 1400; died in 1466. He was associated with Gutenberg in promoting the invention and introduction of printing. Writers generally credit him with furnishing the capital necessary to introduce the printer's art. His methods were preserved as secrets until Mentz was sacked in 1462, after which the workmen settled in different parts of Europe and made known much relating to the apparatus and materials employed. Faust is credited with printing a Bible in the Latin, which is now in the Mazarin library. However, his published works were almost entirely in the German, including various texts, proclamations, and short treatises.

FAUST, Johann, noted magician, who became celebrated in literature as the hero of Goethe's "Faust." It is thought that he was a native of Anhalt, in Germany, and flourished there in the 16th century. He studied theology in Ingolstadt, became a magister at the age of nineteen, and soon after abandoned theology for the study of astrology, medicine, and magic, in which he afterward instructed Johann Wagner, a clergyman's son at Wasserburg. It is said that he made a contract with Satan, which he wrote in his own blood. The terms of the contract provided that Satan was to serve him 24 years, and at the expiration of that time his soul should pass into the possession of the Evil One. Accordingly, the spirit known as Mephistopheles aided him in working the magic arts and in securing visions of the spirit world. This story, though untrue in many details, is made the subject of Goethe's celebrated drama, "Faust," and likewise of Gounod's famous opera known by the same name. The story of Faust and Wagner still forms a conspicuous part in many of the theatricals and operas of Europe.

FAVENC (făv'ęn), **Ernest,** author and journalist, born in London, England, in 1846. He was educated at Berlin and Oxford and in 1865 removed to Australia. In 1878 he took charge of the Queenslander expedition to explore a large part of the interior of Australia, and visited the region as far north as Port Darwin. Subsequently he explored the western part of Australia. In 1888 he engaged in journalism. His publications include "The Secret of the Australian Desert," "The Moccasins of Silence," "The History of Australian Exploration," and "The Geographical Development of Australia."

FAVRE (fȧ'vr'), **Jules,** statesman, born in Lyons, France, March 21, 1809; died in Versailles, Jan. 20, 1880. He studied law and located at Paris in 1835, where he became prominent as a lawyer and liberalist. In 1848 he became secretary general of the interior and opposed the presidency of Louis Napoleon. He spoke in opposition to the measures which

caused the Franco-German War in 1870-71, though afterward supported the national cause. Later he served as minister of foreign affairs. In 1876 he was elected as senator, distinguishing himself by brilliant oratory.

FAWCETT (fą'sĕt), **Henry,** political economist, born in Salisbury, England, in 1833; died Nov. 6, 1884. He graduated with honors at Cambridge in 1856, studied law at Middle Temple, but soon after discontinued it. While out hunting with his father in 1858, a gun was discharged by accident and caused the loss of his sight. This misfortune did not discourage him, but rather increased his vigor and interest in study. He became professor of political economy at Cambridge in 1863, entered Parliament as an advanced Liberalist in 1865, and two years later married Millicent Garret, who attained a reputation as speaker and writer on the civil rights of women. His earnest work in Parliament tended toward reform measures in India, and caused Epping Forest to be opened for the common people of London. In 1880 he became Postmaster-General under Gladstone, inaugurating several reforms in the postal service. A national memorial at Westminster Abbey was erected to him. He is the author of a number of books, including "A Manual of Political Economy," "The Economic Position of the British Laborer," and "Free Trade and Protection."

FAWKES (fąks), **Guy,** or **Guido,** conspirator, born in Yorkshire, England, in 1570; hanged Jan. 31, 1606. He was the leader in the famous Gunpowder Plot, by which the king and Parliament were to be blown up on Nov. 5, 1605. See **Gunpowder Plot.**

FAYAL (fī-ąl'), an island of the Azores, belonging to Portugal. It has an area of seventy square miles. A part of the surface is mountainous, rising to a height of 3,290 feet. The soil is fertile and the climate is favorable to Europeans. Among the chief products are live stock, cereals, fruits, and miscellaneous manufactures. Horta, situated on an eminence 3,000 feet above sea level, is the principal town. Population, 1918, 27,045.

FAYETTEVILLE (fā'ĕt-vĭl), county seat of Cumberland County, North Carolina, at the head of navigation on the Cape Fear River. It is on the Atlantic Coast Line Railroad and has communication by steamship lines. The noteworthy buildings include the county courthouse, the Donaldson-Davidson Academy, and the State normal school for colored students. Among the manufactures are cotton goods, vehicles, ice, woodenware, and tobacco products. It has a large trade in lumber, cotton, flour, and naval stores. The municipal facilties include waterworks, sewerage, and electric lights. It was settled in 1762 and incorporated as a city in 1893. It suffered severe losses during the Civil War, especially in 1865, when it was occupied by General Sherman. Population, 1910, 7,045.

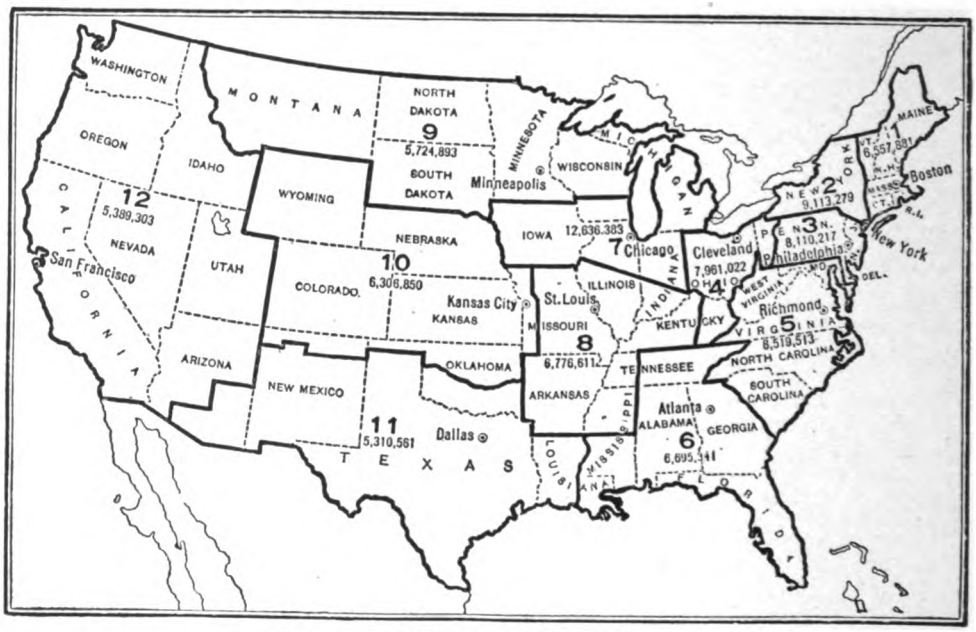
FEATHER GRASS (fĕth'ĕr), a genus of grasses distinguished by their elegant and featherlike awns. The common feather grass is native to the southern part of Europe, where it is found on the dry hills. It grows in closely matted tufts, having numerous tall flower stalks with small florets, and the leaves have a dark green color. The tufts, if gathered before the seeds are ripe, retain their beauty throughout the winter. The esparto grass somewhat resembles feather grass. A species known as rush-leaved feather grass is native to the western part of North America.

FEATHERS, the dermal growths forming the external covering or plumage of birds. Though chemically similar to the hair on the skin of mammals, they differ widely from it in form and color. As a general rule, feathers consist of a central shaft, which is tubular at the base, and is imbedded in the skin like a plant in the earth. On either side of the *shaft* is a web, beard, or wane consisting of barbs and barbules. Feathers are of two kinds—*quills* and *plumes.* The quills grow mainly on the wings and tail, while the plumes are generally diffused. Being poor conductors of heat, they are useful in preserving the temperature of the bird. They are renewed once or twice a year, which renewal is called *molting.* Some feathers are known as *down* and are the first feathers of the birds. Most birds are provided with an oil gland at the base of the tail, whose secretion the animal distributes at various times over the feathers by means of the bill. Feathers form an extensive article of commerce and are used for ornaments, plumes, bedding, pens, and many other useful purposes.



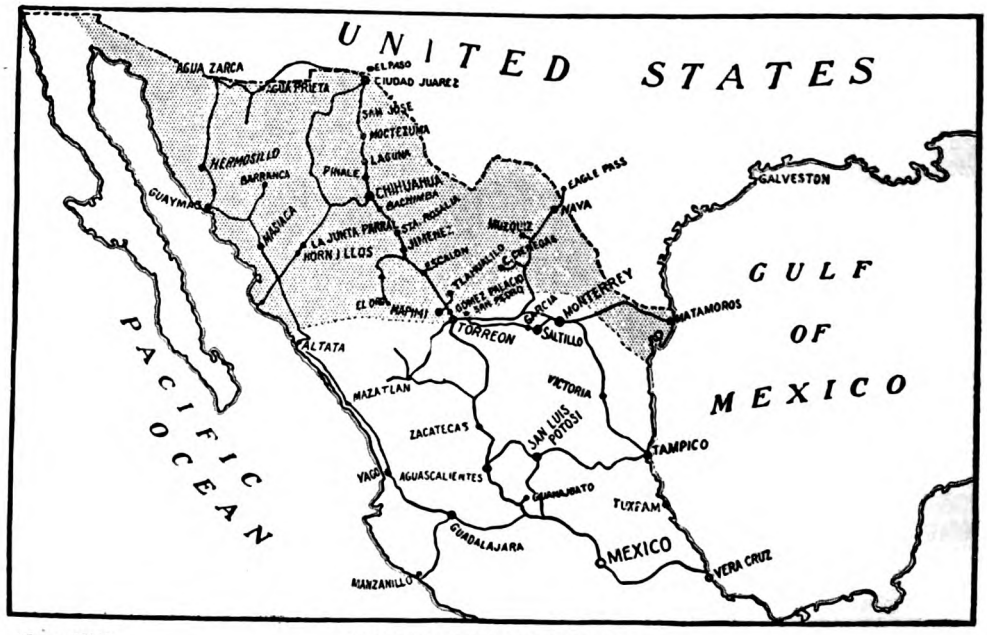
FEATHERS.
Marabou Pheasant Toucon Bird of Paradise Ostrich

FEBRUARY (fĕb'rụ-ą-rў), the second month in our present calendar. It has 28 days, except in a leap year, when it has 29 days. It was first placed after January by the decemvirs of Rome in 252 B. C. Originally it had 29 days, but, when the seventh month was named after Augustus, a day was taken from it and added to August, making the latter month the same length as July.



FEDERAL RESERVE BANK DISTRICTS

Showing cities which have regional reserve banks and the population of the districts.



(Opp. 3280)

REVOLUTION IN MEXICO

The shaded area in the north being the region in possession of the Constitutionalists on May 10, 1914.

FECHNER (fĕk'nĕr), **Gustav Theodor,** physicist and philosopher, born near Muskau, Germany, April 19, 1801; died Nov. 18, 1887. As a writer on aesthetics he made a wide impression, and interest in his works on philosophy continues to extend as they become better known. His "Elements of Psycho-Physics" has gone through several editions and is considered an epoch-making treatise. Other publications of his authorship include "Regarding the Highest Good," "The Theory of Atoms Relating to the Physical and Philosophical," and "Experimental Aesthetics."

FEDERAL HALL (fĕd'ĕr-ąl), the name of the building used as the capitol in New York City, in which Congress met when that city was the seat of government. It was originally erected as a city hall, located on Wall and Nassau streets, and was rebuilt and placed at the disposal of Congress. However, New York retained the national capitol only a short time, as it was removed to Philadelphia in 1790, whence it was removed to the District of Columbia in 1801. Federal Hall was torn down in 1836 and its site is now occupied by a subtreasury.

FEDERALIST, The, a series of essays published in favor of adopting the Federal Constitution of the United States. They were written by John Jay, Alexander Hamilton, and James Madison, in 1787 and 1788, and appeared in the newspapers over the signature *Junius.*

FEDERAL PARTY, the first political party which had control of the government in the United States after the adoption of the Constitution. When the Constitution had been framed and sent by Congress to the states, in 1787, for ratification or rejection, those favoring acceptance were called Federalists and those opposing it were known as Anti-federalists. The Federal party was led by Washington, Pickering, Adams, Ames, Jay, Hamilton, and Morris. By it the machinery of the new government was established, but in this enterprise the prominent leaders of the Anti-federalists were consulted. The district, circuit, and supreme courts were organized by the Federalists; the departments of State, Attorney-General, Treasury, and War were established; the debt created by the Continental Congress was funded; the debts of the states caused by the Revolution were assumed and funded; plans to repay money borrowed from Holland, France, and Spain were made, and, in 1791, the first national bank of the United States was chartered. A strong opposition to some of these measures was conducted by the Anti-federal party under the leadership of Jefferson, Monroe, Randolph, Madison, Gallatin, Gerry, and others, who afterward became leaders of the Democratic-Republican party. In order to secure the consent of the southern and agricultural states, it was necessary for the Federalists to consent that the national capital be located on the banks of the Potomac River.

The second measure of importance was the founding of the Bank of the United States under the leadership of Hamilton. In 1789 the system of levying duties on imports was commenced. Each of these measures was carried out by a strict sectional vote, and the agricultural sections of the north and the south began to oppose the tariff system, which gave Jefferson and Madison a source of strength in organizing the new party. Later the Federalists endeavored to bring the country into war with France, this being prevented only by the policy of Adams, but it tended to divide the party. In 1798 the passage of the alien and sedition laws forever destroyed its popularity. The party succeeded in the election of Washington and Adams, the latter being defeated by Jefferson, in 1800, for reëlection by a decisive vote. As an opposition party the Federalists took a strict-constructionist ground, while some of its leaders engaged in projects for the disruption of the Union. The policy pursued by the party during the War of 1812, and its general distrust of the people, caused its strength to wane and ultimately destroyed all hopes of permanent success.

FEDERAL RESERVE BANKS, the system of banks established in 1914 by the United States. It is under the direction of the Federal Reserve Board which consists of seven members appointed by the President, including the Secretary of the Treasury and the Comptroller of the Currency. The duties of this board embrace the general supervision of the Federal Reserve Banks, with power to discount paper, to issue federal reserve notes, and perform other banking functions prescribed by law. In its duties it is assisted by the federal advisory board, consisting of one member chosen for one year from each of the twelve federal reserve districts. Each Federal Reserve Bank has a board of nine directors chosen for three years. These directors are divided into three classes, that is three directors representing the stockholding banks, three representing some industrial pursuit, and three chosen by the Federal Reserve Board. In each federal reserve district is a reserve city, these cities being Boston, New York, Philadelphia, Cleveland, Richmond, Atlanta, Chicago, Saint Louis, Minneapolis, Kansas City, Dallas, and San Francisco.

FEEBLE-MINDED (fē'b'l mīnd'ĕd), the state of being weak in intellectual power, or being mentally infirm, vacillating, or irresolute. It is a form of imbecility and differs from insanity in that it is less violent, being a form of feebleness rather than mental derangement or unsoundness.

Massachusetts established a State institution for the feeble-minded in 1851, the first State institution in America founded exclusively for these unfortunates, and subsequently many of the states established such schools. The education of the feeble-minded is now considered a necessary and important part of the system of public schools, since it provides training for those unfitted to take up the regular work of instruction, and who are not sufficiently infirm

to be taken to hospitals for the insane, since their training must be of a kind which will strengthen them mentally and tend to develop them to the highest degree of efficiency under a system of training which must begin at an early period in life.

Institutions for the feeble-minded are generally located on a large tract of land within easy reach of some town or city. In this way the inmates are removed from harmful influences common to a populous section, and they are brought in contact with the things of nature and the influence of their teachers under more wholesome environments than those associated with the city. These institutions are in fact a home for the idiotic and the imbecile, who remain there permanently or until such a time as their mental condition will permit them to return home, or to fill some function in life safely and independently. The purpose is to keep the inmates occupied in pleasant and agreeable work, and at the same time teach them the rudiments of an education. The educational work is largely in the form of kindergarten exercises, but those capable of mental progress learn to read, write, and sing. The male adults are taught to do work in the garden or orchard, while the females learn to knit, crochet, mend, and embroider. Much patience and diligence is required on the part of the teacher, who has charge of a small number of inmates, and the latter are graded as nearly as possible according to their age and state of mental development.

FEEHAN, Patrick A., Catholic prelate, born at Killenaul, Ireland, Aug. 29, 1829; died July 12, 1902. At the age of sixteen years he entered Castle Knock College, where he studied two years, and shortly after began the study of philosophy and theology at Maynooth College. In 1852 he emigrated to America, was ordained priest in the latter part of that year, and later served as professor of moral philosophy and sacred history in the Seminary of Carondelet. In 1865 he became bishop of the see of Nashville, where he was successful in reorganizing the diocese, which had been demoralized during the war. He founded the Catholic Knights of America, a lay organization which has a large membership. In 1880 he was appointed first archbishop of the archdiocese of Chicago in recognition of the valuable service rendered.

FEELING, in psychology, the power of the mind by which it is capable of experiencing or perceiving a mental act connected with some need or activity arising through the physical or the psychological nature. *Psychical feelings* have a purely mental source and arise from some conception or mental state. They are connected with some desire or activity, are accompanied by pleasure or pain, and ordinarily are preceded by knowledge, leading to volition. The feelings are the source of all joy and sorrow, and furnish the motives in view of which we choose to act or do. At first thought it may appear that knowledge alone leads to volition, but the influence exercised by desire and aversion is too apparent to be left out of account. Feelings are classified as *emotions, affections,* and *desires.* The simple feelings, as of joy and comfort, are emotions; those that go out toward an object, as of love, are affections; and those in which a wish to possess is manifested, as to possess food or clothing, are desires. See **Touch.**

FELDSPAR (fĕld'spär). See **Felspar.**

FÉLEGYHAZA (fā'lĕd-y'-hä-sŏ), a city of Hungary, 65 miles southeast of Budapest, with which it is connected by railway. It is surrounded by a fertile farming country and has a considerable market in fruit, wine, grain, and cattle. The manufactures include pottery, clothing, cigars, and machinery. It has electric and gas lighting, waterworks, and paved and macadamized streets. Population, 1906, 35,403.

FELIX, Antonius, or **Claudius,** Roman governor of Judaea from 51 to 62 A. D. He married Drusilla, who, according to Tacitus, was the daughter of Antony and Cleopatra. The government of Felix, as described by Josephus, was vigorous and successful, clearing the district of robbers and holding the Jews in submission. His connection with Drusilla was questionable, and, when Paul appeared before him and spoke of righteousness and temperance and alluded to the judgment to come, he trembled in fear and consciousness of being unworthy. He was recalled in 61 A. D., when he was succeeded by Festus, but no decision had yet been reached in the cause against Paul. Charges were preferred against him by influential Jews, probably on account of the part he took in suppressing the riots between the Jews and Syrians, and he barely escaped a death sentence.

FELLAH (fĕl'lä), an Arabic word meaning peasant or farmer, applied to a laboring and agricultural class in Egypt. They form the bulk of the population and are descendants of the ancient Egyptians, intermingled with Arabs, Syrians, and other races of Africa and Eurasia. In social position they are inferior to the Bedouins. The men are of medium height, have a dark color, a large head with a facial angle of about 90°, thick lips, and small hands and feet. The women tattoo themselves and marry at an early age. Fellahs exhibit the moral qualities of the ancient Egyptians, being intelligent, grave, and sober on the one hand; but idle, jealous, licentious, and of unbending obstinacy on the other. A few are Copts, but Mohammedanism is the chief religion.

FELLOWSHIP (fĕl'lō-shĭp), the name of a position provided in many of the institutions of higher learning, both in America and Europe. The holder of such a positon is called a *fellow,* who is appointed to the place for em-

inent scholarship, the object being to make it possible for him to pursue advanced studies. In some institutions the appointment is for a year only, while in others the period ranges from five to seven years, and the holder of a fellowship receives an annual stipend and other valuable perquisites. The ranks of the faculties are frequently recruited from the fellows. In England many fellowships are tenable for life, though in some institutions, such as Cambridge, they are for a definite term of years. However, the income in England is larger than in America, since the fellows receive from $500 to $2,500 annually. The trustees in some institutions of the United States are called fellows.

FELSPAR (fĕl'spär), or **Feldspar,** a group of minerals which embraces many species. In some form, it is the principal constituent of granite, gneiss, greenstone, and many other rocks, while clays seem to have resulted very generally from its decomposition. The minerals of this group occur in crystals and crystalline masses, are vitreous in luster, and break rather easily in two directions at right angles to each other. The colors are usually white, flesh-red, bluish, or greenish. All kinds of felspar are so hard that they cannot easily be scratched with a knife. They are fused with difficulty, but are quite soluble in acids. Several species are of a fine grade, including those known as potash felspar, lime felspar, and soda felspar. A nearly colorless variety, known as *moonstone,* is often cut into ornaments and is prized almost as a gem. Another species with golden-yellow specks, called *sunstone,* is very rare and beautiful and commands high prices. *Labradorite,* obtained chiefly in Labrador, and *Amazon stone,* found in the Ural Mountains, are esteemed as precious stones. In decomposition felspar not only yields clay, but also the mineral *kaolin,* both of which are essential elements in the manufacture of fine pottery and porcelain. Felspar of commercial value is obtained in Greenland, in the Adirondack region of New York, in the Rocky Mountains of British Columbia and Colorado, and in other sections.

FELT, a kind of cloth made without weaving by taking advantage of the natural tendency of the fibers of hair and wool to interlace with and cling to each other. The materials are carded more or less perfectly, steamed or moistened with hot water, and passed between beaters and rollers which press them into compact cloth or felt. This class of material is used extensively for carpeting and in padding coats, caps, cloaks, and other garments. It is valuable in making table covers, carriage-linings, upholstery work, and piano hammers, and for sheathing boilers and hot-water reservoirs. When saturated with pitch, coal tar, or asphalt, it is used for covering sheds and similar buildings. Beaver hats are made in the same manner of the fur of beavers, rabbits, raccoons, and other animals.

FEMUR (fē'mŭr). See **Skeleton.**

FEN (fĕn), a tract of low land which is subject to overflow, or is partially or wholly covered with water. The name is used extensively in England, where it has reference to the Fens, or Fen District, which consists of a moor or boggy land that produces coarse grasses. These regions have a peculiarly rich soil and are frequently redeemed by drainage and the construction of dykes.

FENCE, an inclosure constructed of posts set in the ground, having fastened to them wire, rails, or boards. The posts are usually of wood, though iron is used for that purpose to some extent, and in regions having a large supply of rocks some fences are constructed of stone. Fences that inclose a yard are commonly made of boards or woven wire, while the larger fields and ranches are fenced with barbed wires. In some sections many fences are made by planting shrubs together closely in rows, such as willow or osage orange, but these are not as common now as formerly, since they require considerable care and to some extent interfere with the growth of crops near the fence line. Barbed wire used for fencing is usually twisted of two strands, and the main wire has barbs from three to four inches apart. It is the chief material in constructing fences, though its use is not permitted in the cities and along the roads in some states, where smooth wire is used instead. See **Wire.**

FENCING, the art or practice of attack and defense with the sword or rapier. The instrument used chiefly is a small sword made to taper gradually from the hilt to the point, and the size depends upon the rules governing the practice. The rapier is a straight sword with a narrow and finely pointed blade, and is used only for thrusting. A blunt weapon called a *foil* is used chiefly in gymnasiums. It resembles a small sword in the main, but is usually lighter and has a button at the point to prevent accidents in practice. Fencing became popular among the noble and knightly class at the close of the 15th century, when it consisted chiefly of rapier and dagger play, and those engaged in the practice were covered with armor or carried a shield. It took first rank as a favorite form of exercise in the schools and gymnasiums of European countries, where it is still practiced quite extensively, but in America it never rose to a place of considerable importance as a school practice. The Amateur Fencers' League of America, which is associated with the Amateur Athletic Union, is the most important fencing organization in the United States. It has four competitive contests each year, the most important being with dueling swords and sabers, while the others are with foils. Fencing teams are maintained by the principal colleges and universities and these hold intercollegiate

contests. New York, Philadelphia, Boston, and Montreal are classed as the leading fencing centers of America.

FÉNELON (fā-nę-lôn'), **François de Salignac de la Mothe,** prelate and author, born in the Château of Fénelon, France, Aug. 6, 1651; died Jan. 7, 1715. He was trained at home until twelve years of age, when he was taken to Cahors, and afterward received a liberal education in Paris. When twenty years of age, he entered the seminary of Saint Sulpice, where he studied theology and was granted holy orders in 1675. In 1678 he was appointed director of an institution in Paris for the reception of females. Being highly successful in attending to the duties incumbent upon him, he was placed at the head of a mission detailed to preach in Saintonge and Poitou. Louis XIV. recognized his ability and appointed him preceptor to his grandson, the Duke of Burgundy, in 1689. His success in this capacity was awarded by a royal appointment to the abbey of Saint Valery and soon after to the archbishopric of Cambrai. The exceptional ability and breadth of character of Fénelon were shown in a long controversy with Bossuet, who had denounced him as a heretic, which ended March 12, 1699, by an adverse decision of the Pope. Perhaps, no life of the 17th century presents a greater devotion to Christianity and the elevation of mankind in moral goodness than that of Fénelon. He is distinguished as an educator chiefly because he advocated the general education of women. His body was buried in the Cathedral of Cambrai. His publications embrace treatises on theology, philosophy, literature, history, and oratory, and have appeared successively in twenty large volumes. The most noted are "The Maxim of the Saints" and "The Temporal Power of the Mediaeval Popes."

FENIANS (fē'nĭ-ąns), the name derived from a class of ancient Irish warriors, the *Fianna* or *Fionna,* founded as home guards in the 3d century. In modern times it was made the name of a political association that has for its aim the forcible liberation of Ireland from British sovereignty. The Fenian movement of the last century dates from 1857, when John O'Mahoney, James Stephen, O'Donovan Rossa, and other prominent leaders established a brotherhood in America. The object was to make the United States the base for operations in Ireland and Canada against the English, the central headquarters being in New York City.

In 1863 large sums of money were collected to organize for aggressive hostilities, and a convention was held at Chicago for the purpose of formulating plans. An attempt to invade Canada was made in 1866, but the object was frustrated by a capture of the stores of arms and provisions by United States authorities. About the same time an uprising in Ireland was suppressed by seizing the *Irish People,* a Fenian publication at Dublin, and arresting a number of leaders. Another effort was made to invade Canada in 1871, which likewise proved unsuccessful. An attempt to destroy British ships and prevent shipbuilding by the use of dynamite was designed in 1883, though the enterprise met with little success, the principal promoters being apprehended and sentenced to penal servitude for a term of years. Within recent years the brotherhood, although having many sympathizers in Europe and America, has not pursued active operations, but organizations are still maintained.

FENNEC (fĕn'nĕk), a small animal of Africa, resembling a small fox. The tail is nearly as long as the body, which has a length of a foot, and the ears are three inches in length. It has a yellowish color, except the tip of the tail, which is black and bushy. The fennec is native to the Sahara Desert and is called Sahara fox by some writers. It burrows in the ground, where it spends most of the day, and at night comes out in search of food. It subsists on insects, birds, mice, lizards, and the tender parts of plants.

FENNEL (fĕn'nĕl), a fragrant umbelliferous plant cultivated in gardens to a considerable extent for its aromatic qualities. The flowers are small and yellow or white, and the leaves, sometimes used in cookery, are finely divided. Among the common species are the giant fennel, common fennel, sweet fennel, and Indian fennel. The seeds are carminative and are used in medicine.

FERDINAND I. (fĕr'dĭ-nănd), sovereign of the Holy Roman Empire, born in Alcala, Spain, March 10, 1503; died July 25, 1564. He was the son of Philip I. and brother of Charles V. of Germany, whom he succeeded as Holy Roman Emperor in 1556. He married Princess Anna of Hungary in 1521, became King of Bohemia and Hungary at the death of Louis, brother of his wife, in 1526, though his claim was contested, but by the aid of the Turks he secured recognition. Ferdinand was elected emperor on the abdication of Charles V., and during his brief reign attained a reputation for ability, justice, and enlightenment. Among other wholesome measures, he reformed the monetary system, conciliated his subjects in religous affairs, and added Hungary and Bohemia to his empire. He was succeeded on the imperial throne by his son, Maximilian II.

FERDINAND II., sovereign of the Holy Roman Empire, born in Grätz, Austria, July 9, 1578; died in Vienna, Feb. 15, 1637. He was the grandson of Ferdinand I., being the son of Charles, Duke of Styria. His education was wholly under the Jesuits. In 1619 he ascended the throne. The training and sentiment of Ferdinand were in strong opposition to the Protestant church, and he began early in his reign to seek the extermination of all holding to that confession of faith. The religious war that commenced in the duchy of Styria and Bo-

hemia soon spread over a large portion of the empire and the adjacent countries, and has gone down in history as the Thirty Years' War. It began to appear that the Protestant faith would be forever stamped out of Europe under the leadership of the imperial forces by Wallenstein, when Gustavus Adolphus of Sweden unexpectedly crossed into Germany, meeting the imperial forces at Lützen on Nov. 6, 1632, and there dealt a complete defeat to the designs of Ferdinand. The ability demonstrated by the Swedish generals was more than equal to that of the Austrian leaders. Shortly after the Battle of Lützen, Ferdinand caused Wallenstein to be assassinated for the reason that he feared the rising power of that general. His reign was marked with many disastrous battles, while armies organized under his imperial command left nothing but ruin and desolation in their track.

FERDINAND III., sovereign of the Holy Roman Empire, born in Grätz, Austria, July 20, 1608; died April 2, 1657. He was the son of Ferdinand II. and succeeded him to the throne in 1637. His disposition was milder than that possessed by the father, and he showed less fanaticism in his support of the ecclesiastical party. Religious toleration was granted in most parts of the empire, and the German nation began to recover from the fearful ravages of the great wars that had demoralized trade and destroyed more than half the population. Concessions were granted in the interest of peace to independent princes, while France obtained part of Alsace and Lorraine and Sweden secured Western Pomerania. The German Empire practically ceased to exist at the death of Ferdinand III., and was not reëstablished until the new German Empire rose under William I., after the close of the Franco-Prussian War in 1870-71.

FERDINAND I., surnamed the Great, first sovereign of independent Castile, born in the year 1000; died Dec. 27, 1065. He succeeded to the throne in 1035. In 1053 he defeated his brother, Garcia III., King of Navarre, who had attacked his army, and extended his dominions by annexing a number of provinces previously governed by the defeated sovereign. He entered upon a plan early in his reign to suppress the Moors, for which purpose he extended the Christian frontier from the Douro to the Mondego, and reduced to vassals the emirs of Saragossa, Toledo, and Seville. Shortly after he claimed the title of Emperor of Spain, though a decision rendered at the conference held in Toulouse conceded him only the portions conquered from the Moors.

FERDINAND II., King of Leon, younger son of Alfonso VIII., ascended the throne in 1157; died in 1188. His reign of 31 years is obscure, but is marked most distinctly by the successes over the Moors and the incorporation of the noted military order of Alcantara under sanction of Pope Alexander III. in 1177. His death occurred at Benavente, and his son, Alfonso IX., succeeded him.

FERDINAND III., King of Castile, known as Saint Ferdinand, son of Alfonso IX., born in 1199. Henry I. of Castile died without issue in 1217, and Ferdinand III. was proclaimed king in 1230, immediately succeeding his father. The events for which his reign is most distinguished include the vigorous wars waged against the Moors. His most celebrated victories were those at Ubeda in 1234, at Cordova in 1236, and at Seville in 1248. In the latter part of his reign he planned an expedition to Africa, but died before his hopes could be realized, his death occurring at Seville on May 30, 1252. Pope Clement IX. canonized him in 1671 on account of his zeal in the Christian cause. The Spanish calendar designates his fast-day on May 30.

FERDINAND IV., King of Castile and Leon, born in Seville in 1285, suceeded his father, Sancho IV., in 1295. His reign of seventeen years became renowned by several successful wars against the Moors. His death occurred at Jaén while on a campaign, Sept. 7, 1312.

FERDINAND V., King of Castile, II. of Aragon, III. of Naples, and II. of Sicily, born in Aragon, Spain, March 10, 1452; died Jan. 23, 1516. He was the son of John II. of Navarre and Aragon, was recognized heir apparent to the crown on the death of his brother Carlos in 1461, and was associated with his father in the government of Aragon as early as 1468. About the same time he was declared King of Sicily by his father. In October, 1469, he married Isabella, the sister and heir of Henry IV. of Castile, at Valladolid. When Henry IV. died in 1474, Ferdinand and Isabella were recognized joint sovereigns of Castile. In 1478 he reorganized the Inquisition as a means to further religious ends. His zealous support of the Catholic princes in Spain caused the expulsion of 160,000 Jews and the termination of Moorish power in Spain in the year 1492. Soon after he added Navarre and Naples to his possessions and formed the entire Iberian peninsula into one state, with the exception of Portugal. The most interesting event connected with his reign is the discovery of America by Columbus, though the honor of granting imperial support belongs wholly to Isabella. Ferdinand V. was a crafty and ambitious ruler, but in character he lacked both stability and veracity.

FERDINAND VI., King of Spain, son of Philip V., born in Madrid, Sept. 23, 1713; died Aug. 10, 1759. He ascended the throne in 1746, and entered at once upon a vigorous attempt to conclude the war with England that had waged since 1739, which resulted in the Treaty of Aix-la-Chapelle in 1748. Dying without issue, he was succeeded by his half-brother, Charles III.

FERDINAND VII., King of Spain, born at San Ildefonso, Oct. 13, 1784; died Sept. 29, 1833. He was the eldest son of Charles IV. and of Maria Louisa of Parma, became Prince of Asturias in 1788, and, when his father was forced to abdicate on account of a popular rising in March, 1808, he ascended the throne. A month later Napoleon compelled him to abdicate and conferred the sovereignty upon Joseph, brother of Napoleon. When the imperial army of France was defeated at Vittoria on June 21, 1813, by Wellington, Ferdinand was permitted to reënter Spain and occupy the throne on the condition that he would expel the English from the peninsula. The arbitrary reign of Ferdinand caused an insurrection in 1820, but an army was sent to aid him by Louis XVIII. of France, by which his authority again became supreme. The act of 1713, passed during the reign of Philip V., excluded women from the throne of Spain, but this Ferdinand set aside to make place for his daughter, Isabella, and thereby excluded his brother, Don Carlos. The reign of Ferdinand was generally unsuccessful, being marked by numerous insurrections, the loss of most of the colonial territory in America, and a consequent widespread interference with commercial and manufacturing enterprises in Spain.

FERDINAND I., King of Naples, son of Alfonso V. of Aragon, born in 1424; died Jan. 25, 1494. Although he succeeded to the throne in 1458, he was not recognized by Pope Calixtus III., who championed the cause of John of Anjou. The latter defeated him July 7, 1460, but, when Pius II. recognized Ferdinand, he secured a victory over John of Anjou, Aug. 18, 1462, thereby attaining supremacy.

FERDINAND IV., King of Naples, born in Naples, Jan. 12, 1751; died Jan. 4, 1825. His father ascended the throne of Spain in 1759, and Ferdinand became his successor on the throne of Naples under a regency. He married Maria Carolina, daughter of Empress Maria Theresa, in 1768.

FERDINAND I., King of Rumania, born at Sirmaringen, Prussia, Aug. 24, 1865. His father, Leopold of Hohenzollern, resigned in his favor as heir to the crown of Rumania in 1888. He married Marie, daughter of the Duke of Saxe-Coburg and Gotha, in 1875, and in 1914 succeeded his uncle, Charles I., on the throne.

FERDINAND I., Czar of Bulgaria, Duke of Saxe, born in Vienna, Austria, Feb. 26, 1861. He was chosen Prince of Bulgaria on July 17, 1887, by the grand national assembly at Tirnova, subscribed to the constitution, and on Aug. 14, 1887, assumed the reins of government under the title of Ferdinand I., although his election was not confirmed by the Sultan of Turkey, or by the treaty powers. On April 8, 1893, he married Marie Louise, daughter of the Duke of Parma of the house of Bourbon. Shortly after he joined the Greek Church, which course was taken as a step toward securing the confidence of the Russian government, and his policy since has been marked largely by influences exercised through Muscovite diplomats, though in the main he has been eminently successful. In 1908, with the hearty support of his constituents, he declared Bulgaria an independent monarchy and assumed the title of Czar of Bulgaria.

FERGUS FALLS (fĕr'gŭs fąls), a city in Minnesota, county seat of Ottertail County, on the Otter Tail River, 186 miles northwest of Minneapolis. It is on the Northern Pacific and the Great Northern railroads. The noteworthy buildings include the county courthouse, the high school, the public library, the Park Region Lutheran College, and a State hospital for the insane. It has manufactures of flour, ironware, clothing, cigars, and machinery. The Otter Tail River supplies an abundance of water power, by which various manufactories, an electric light plant, and several mills are operated. It was settled about 1861 and incorporated as a city in 1863. Population, 1910, 6,887.

FERGUSON (fĕr'gŭ-sŭn), **James**, astronomer, born near Keith, Scotland, in 1710; died in London, Nov. 16, 1776. He descended from poor parents, studied astronomy while a boy tending sheep, and later utilized his careful observations for constructing a celestial globe and astronomical apparatus. Subsequently he took a course of training at Edinburgh, where he became skilled in mathematics and drawing, and later supported himself by making portraits. Removing to London in 1743, he engaged in painting, and gave a course of lectures on experimental astronomy. George III., then Prince of Wales, was attracted to his lectures, and afterward gave him a pension of $250 a year. Among his principal works are "Lectures on Mechanics," "Astronomy Explained upon Newton's Principles," and "Select Mechanical Exercises."

FERMENTATION (fĕr-mĕn-tā'shŭn), a change which takes place in most animal and vegetable substances when they are exposed to air and moisture at ordinary temperatures. It is a chemical decomposition of an organic compound induced by chemical agents or by living organisms. In the former, called *unorganized* or *chemical* ferments, the enzyme causes a structural change without losing its identity, as in digestion; while in the latter, called *organized* ferments, the action is due to the growth of the ferment, as in the formation of acetic acid from alcohol by the action of the vinegar plant. The various organisms which produce fermentation apparently derive their nourishment from the original compound, and yield products that are poisonous to the ferment. It is for this reason that chemical decomposition ceases when fermentation products are in excess, or the nutriment is exhausted. It is arrested by certain substances, such as salt and alcohol, called *antiseptics*, as well as by heat and cold.

Several kinds of fermentation are recognized, the name depending upon the specific product obtained. In *alcoholic* fermentation the sugar contained in liquids is converted into carbonic acid, alcohol, and glycerin; in *acetic*, the spirituous liquors become acid and produce acetic acid; and in *putrid* fermentation, organic substances are altered in various ways, the alteration depending upon the nature of the substance, and poisonous gases are generally set free. Besides these are *ammoniacal*, yielding ammonia; *benzoic*, yielding benzoic acid; *amylic*, yielding amylic alcohol; *viscous*, yielding a gummy mass; *lactic*, yielding lactic acid; and *butyric*, yielding butyric acid.

The various kinds of fermentation may be effected at different degrees of temperature, varying from about 24° to 104° Fahr. In digestion the ferments of the pancreas act on fibrin at 90°. Viscous fermentation, in which wine is made thick and viscous so it forms threads when poured, occurs at a temperature of from 60° to 104°. Alcoholic fermentation under certain condition takes place readily at 24° to 30°. The ferments employed to excite fermentation are mostly organic, though there are many of an inorganic nature. Among the most common fermented liquors containing alcohol and used as beverages are wine, made from the juice of grapes; mead, from honey; cider, from apples; ale or beer, from an infusion of malt; and chica, from maize. The last mentioned is made in large quantities in South America. See **Beer.**

FERNANDEZ (fĕr-năn′dēz), **Juan,** navigator, born in Spain in 1536; died in 1602. He became a navigator at an early age and for forty years promoted explorations and settlements in South America. In 1562 he discovered the island of Fernando de Noronha, a small island in the South Atlantic Ocean, about 200 miles northeast of Cape Saint Roque. Enchanted with the beauty of this island, he established a colony there, but it proved a failure. In 1590 he settled in the mountains of Chile, where he remained until his death.

FERNANDINA (fĕr-năn-dē′nȧ), a city of Florida, county seat of Nassau County, on Amelia Island, 35 miles northeast of Jacksonville. It is on the Florida Central and Peninsular Railroad and has a good harbor on the Amelia River, which separates the island from the continent. The city has a large trade, both inland and foreign, in lumber, cotton, phosphates, and merchandise. A fine shell road extends to Amelia Beach. Cumberland Island, located near the city, was the home of Gen. Nathaniel Greene and is the burial place of Light Horse Harry Lee. Fernandina was settled by the Spaniards in 1632, and was incorporated in 1859. Population, 1910, 3,482.

FERNANDO PO (fĕr-năn′dŏ pō′), an island belonging to Spain, located in the Bight of Biafra, about 20 miles off the west coast of Africa. It is 42 miles long and 20 miles wide, and has an area of 768 square miles. The surface is mountainous, but the soil is fertile and well watered. Clarence Peak, the highest summit, has an altitude of 11,025 feet. The climate is hot and unhealthful. Among the chief products are rice, bananas, corn, yams, and live stock. The Portuguese discovered the island in 1471, but it became a part of Spain in 1787. Santa Isabel, the chief town, has a population of 1,500. The island is inhabited chiefly by native Negroes and Portuguese. Population, 1918, 21,346.

FERNS, a class of leafy but flowerless plants, springing from a rhizome, which creeps on the surface of the ground, or rises in the air like the trunk of a tree. This trunk does not taper, but is of equal diameter at both ends. The reproductive organs consist of spore cases and are attached to the veins at the under surface of the leaves, or at their margins. Most ferns are comparatively small, while some tree ferns



FERN-TREE. *a.* SPORE CASES.

reach sixty feet in height. Seventy-five genera and about 4,000 species are known. Some ferns yield products useful for food, while other species contain properties which are of value in medicine for expelling tapeworms. The fronds of ferns, or their impressions, are frequently met with in a good state of preservation as early as the middle of the Silurian period.

FERRARA (fĕr-rä′rȧ), a city in Italy, capital of a province of the same name, situated on the Po River, about 26 miles northeast of Bologna. The site is low and unhealthful, but the streets are broad and well paved. It is an ancient city and has many towers and bastions. Among the most beautiful of ancient buildings are the old ducal palace and several cathedrals. A number of fine monuments are in the public places, one being dedicated to Savonarola, who was born here. The public library contains 100,000 volumes. It has modern municipal facilities, while railroad and telephone connections are well established. Among the manufactures are pottery, clothing, utensils, and machinery. Ferrara was an important city in ancient times,

when it had 100,000 inhabitants, and its university dates from 1264. It was long held as a fief of the popes, came under the rule of the house of Este, and in 1797 was united with the Cisalpine Republic. In 1814 it was restored to the popes, but has been a part of Italy since 1859. Population, 1916, 88,064.

FERRET (fĕr'rĕt), a carnivorous animal of the weasel family, but closely allied to the polecat. In form and size it approaches the common mink. It is native to Africa and cannot endure excessive cold. The representative species are about fourteen inches long and of a yellowish color. Ferrets are much used, both in America and Europe, for destroying rats and



FERRET.

for driving rabbits out of their places of seclusion. Several species are carefully bred in captivity, in which state they subsist on bread, raw meat, and milk. The *black-footed ferret*, found in the western plains of North America, is a species of the weasel. It is about two feet long, has a pale brown color, and the feet and tip of the tail are black. This animal is seen in the towns of prairie dogs, upon which it feeds.

FERRIS, George Washington Gale, engineer, born in Galesburg, Ill., in 1858; died in 1896. He was taken to California by his parents at an early age, where he received his elementary education, and in 1881 graduated at Troy, N. Y., from the Rensselaer Polytechnic Institute. Shortly after he located in business at Pittsburg, Pa., engaged in extensive construction work, and, when a special structure was desired for the Columbian Exposition that should rival the Eiffel Tower, he began to prepare the necessary specifications. This resulted in plans for the celebrated Ferris Wheel, which attracted universal admiration at Chicago in 1893, and at Saint Louis in 1904, and was a source of much profit to the promulgators of the enterprise.

FERRIS WHEEL, an immense structure designed and invented by G. W. G. Ferris, and constructed in Chicago in 1893 as a popular feature in the Midway Plaisance at the Columbian Exposition. This great wheel, the largest ever built, contained two wheels of the same size that were securely connected by struts and rods. An axle thirty-one inches in diameter and forty-five feet long was at the center, while the spokes were iron rods two and a half inches in diameter, placed in pairs thirteen feet apart at the crown connection. Thirty-six cars were hung on the periphery, each having a convenient seating capacity for forty passengers. The weight of the wheel and passengers was 1,200 tons, this immense burden being supported by substantial mechanical devices and a solid concrete foundation. The circumference of the wheel was 825 feet; diameter, 250 feet; and elevation above the ground, fifteen feet, making a total height of 265 feet. It was lighted throughout the exposition season by 3,000 electric lights. The total cost of construction aggregated $300,000, while the number of passengers carried during the period of operation was 1,454,013. It was taken down at the close of the exposition and erected near Lincoln Park, Chicago, and in 1904 was removed to the exposition in Saint Louis.

FERROL (fĕr-rôl'), a city of Spain, in the province of Coruña, on the Bay of Betanzos, twelve miles northeast of Coruña. It has a fine harbor and is strongly fortified. The manufactures include hardware, leather, chocolate, cutlery, and firearms. Among the chief buildings are those of the government, a number of churches, and several schools. The streets are wide and regular and are beautified by several squares and promenades. Electric lights and street railways are among the public utilities. Ferrol was made a naval station by Charles III., and still has the largest shipbuilding interests in Spain. The French captured it in 1809 and in 1823. Population, 1917, 26,875.

FERRY (fĕr'rў), a passage by boat across a small body or stream of water. Ferryboats ply back and forth across water to carry passengers, horses, vehicles, or any other form of traffic. Any mode of power may be used to propel the boat, which is usually fastened to a cable stretched from bank to bank. Sometimes a pulley is placed over the cable and the action of the water in a running stream carries it across. Large ferries are propelled by steam and furnish transportation for several thousand passengers, as those operated in New York City across the Hudson and the East rivers. In some cases entire trains are transported by steam ferry, as across Hampton Roads, the Columbia River, and the Straits of Mackinac.

FERRY, Jules François Camille, statesman, born in Saint-Dié, France, April 5, 1832; died

March 7, 1893. He was admitted to the Paris bar in 1854, and soon afterward identified himself with the opponents of the empire. In 1865 he secured an election to the legislature, opposed the war with Prussia in that body, and assisted in suppressing the Commune in 1870. After the establishment of the republic, he became minister to Athens and in 1879 was made minister of public instruction. When the ministry dissolved in 1880, it devolved upon him to form a cabinet, which soon after adopted a policy of colonial expansion, but he resigned in 1881 as a result of dissensions regarding the military contentions in Tunis. In 1883 he was again made premier, but his ministry was overthrown in 1884 by an adverse vote in relation to the war with China. The defeat of the French troops in Tonquin made him unpopular, and he withdrew into retirement until 1893, when he was recalled to public life on account of the Panama Canal excitement. His death occurred shortly after his election to the presidency of the senate.

FERTILIZERS (fĕr'tĭ-lī-zĕrz), the general name of substances that are used to enrich the soil and promote the growth of plants. It is common to distinguish between homemade and commercial fertilizers, the former being known as *manure* and the latter as *fertilizers*. In a restricted sense the latter applies only to the materials that pass through some process of manufacture before being utilized in farming or gardening. They include such inorganic materials as nitrate of soda, sulphate and chloride of potash, and variously prepared forms of sulphatic rock. Another class embraces such organic substances as guano, bone dust, and the refuse from slaughterhouses. Desiccated and ground sheep manure is a kind of commercial fertilizer.

Stable manures are usually spread on the ground and plowed under, while commercial fertilizers are drilled into the soil in connection with wheat, corn, rye, and other grains, and in this way the plant food comes in direct contact with the roots of the growing plants. The manufacture of commercial fertilizers is regulated by law in many states and provinces, requiring in most countries supervision under the state or government, and the different classes are tested and graduated on the basis of their utility as plant food. This is quite necessary, since the agricultural classes otherwise would be unprotected against the use of worthless or harmful materials. See **Manure.**

FESSENDEN (fĕs'ĕn-dĕn), **William Pitt,** statesman, born in Boscawen, N. H., Oct. 16, 1806; died at Portland, Me., Sept. 8, 1869. After securing a law education, he entered the practice in Maine and in 1832 was elected as a Whig to the Legislature, where he served a number of terms. The Free-soil democrats and Whigs elected him to the United States Senate in 1854, and he served in that body two terms. He became a prominent factor in organizing the Republican party, opposed the Kansas-Nebraska bill, and attended the peace convention in 1861. In 1864 he succeeded Salmon P. Chase as Secretary of the Treasury, which he resigned the following year to again enter the Senate During his last term he was chairman of the joint committee on reconstruction and of the finance committee. Fessenden opposed the impeachment of Andrew Johnson, and was one of the seven Republican senators who voted against conviction after the trial by the Senate.

FESTIVALS (fĕs'tĭ-vąlz), or **Feasts,** a period of one or more days consecrated to commemorate some important event or the observance of some religious rite. Festivals were held by most ancient nations and have continued to be observed throughout the modern centuries, though in a modified form. At the time Homer wrote the "Iliad" it was customary among the Greeks to keep two principal festivals—those of the harvest and the vintage—in which the deities were borne through the assemblages, animals were sacrificed, and the sounds of music rent the air. The six sacred festivals of the Jews are enumerated in Leviticus xxiii. The ancient Greeks celebrated the festivals of Dionysia and Eleusinia and the Pythian, Olympic, Nemean, and Isthmian games, the four last mentioned constituting their great national games. Many festivals were celebrated in ancient Rome, but the Cerealia, Lupercalia, and Saturnalia constituted the more important. Many of the civil festivals of the Romans and Greeks were similar in that they constituted warlike games and exercises.

The festivals kept by the Christians give distinct reference to Christ and other personages held important in the history of the church. Formerly each festival was known as a *holy day,* hence the name *holiday.* The observance of Sunday is of most frequent occurrence. Other festivals designated in the Christian calendar have reference to events in the life of Christ, such as Christmas, Annunciation, Purification, Easter, Ascension, Corpus Christi, Epiphany, Transfiguration, and Trinity. Numerous festivals are set apart to commemorate saints, apostles, and angels, though in most of the churches every day of the year is dedicated to some personage or event. The term *holiday* at present has particular reference to the days set apart by the government to commemorate some important personage or event. See **Holiday.**

FESTUS, Porcius, the Roman governor of Judaea under Nero in 61-62 A. D., who succeeded Felix. The apostle Paul appeared before him as a prisoner, and, after hearing his remarkable plea, Festus manifested a disposition to set him free, but Paul appealed to Caesar and was accordingly sent to Rome.

FETICH (fē'tĭsh), or **Fetish,** a word introduced by Charles de Brosses (1709-1777) in

1760 in his publication, "Du Culte des Dieux Fetiches." It was derived from the Portuguese word *feitiço,* meaning *magic,* a term which expresses the idea held by the Portuguese concerning the religion of the natives found in Western Africa. The name was applied by Comte in a general way to the primitive theories of religion, but Sir John Lubbock assigns it as the second stage in the evolution of religious thought, rather than as a form of religion. He takes this view for the reason that the idea of worship is not necessarily involved, since the Negro believes that his deities can be compelled to comply with his desires by means of his fetich. Fetichism is a form of superstition which supposes the earth, feathers, trees, mountains, plants, serpents, and other animate or inanimate objects to have a spirit, and that the person having possession of the object can utilize that spirit as a servant. If the spirit does not attend to all the possessor requests, he beats the object as if to inflict pain as punishment. The most extensive forms of fetich worship prevail in Guinea and other portions of Western Africa.

FEUDAL SYSTEM (fū'dạl), an economic system or condition in force throughout Europe for many centuries. It was distinguished by the political and social ranks which were based on the tenure of feuds and fiefs, given as compensation for military service rendered by chiefs. Under these owners the land was sublet by allotment to their subordinates and vassals in consideration of like service to be rendered. According to the feudal system, the king was the owner of all the land in his dominion, while noblemen held certain tracts under grants from him at his pleasure, but usually on condition of military service. When the Teutonic conquerors of the Roman Empire acquired paramount power, the feudal system made it possible for them to hold possession under the influence of noblemen, who were personally benefited. It had spread over all of France and Germany by the time William the Conqueror led his expedition into England, and soon after all the land was seized and a feudal system was established. It prevailed in England in a widespread form until the restoration of Charles II. However, traces of it are still abundant, but the conditions are greatly modified.

The people of England, who had acquired absolute possession under the Angles and Saxons, universally opposed the establishment of feudal ownership. Here the lands were said to be *allodial* to distinguish them from the *feudal* lands. Later both classes of ownership were recognized, the allodial estates being held by the noble and ordinary freemen and the feudal by those who were bound to serve some superior lord. The latter system possessed some advantage in that it furnished greater security of life and property, hence it came to predominate as a matter of necessity. Even the minor nobles who owned estates voluntarily placed themselves for protection under some more powerful earl or duke, which gradually gave rise to the powerful principalities of Germany and the whole continent.

The feudal system began to crumble with the rise of learning. Other causes of its decline include the spread of civilization, a wider knowledge of the rights of citizens, the rise of cities, and a change in the modes of warfare. Traces more or less prominent are still found in some countries, such as landowners holding title only as tenants from lords or titled nobles. On the banks of the Rhine and in many regions of Germanic and Romanic countries are remains of the system, such as castles formerly occupied by feudal barons and numerous villages in which dependents were grouped for religious worship and educational instruction.

FEUERBACH (foi'ĕr-bāk), **Ludwig Andreas,** philosopher, son of Paul J. A. Feuerbach, born in Landshut, Germany, July 28, 1804; died Sept. 13, 1872. He first studied at Heidelberg and later at Berlin under Hegel. In 1828 he secured a professorship in the University of Erlangen, but after a few years devoted all his time to literary work. His teachings contend against immorality, and hold that truth can be ascertained only by the senses coming in touch with things. Among his best known works are "The Essence of Religion," "Thoughts Regarding Life and Death," "Godhead, Freedom and Immortality," and "The Essence of Christianity." The last-mentioned book was translated by George Eliot in 1854.

FEUERBACH, Paul Johann Anselm, distinguished criminal jurist, born in Jena, Germany, Nov. 13, 1775; died May 25, 1833. He graduated from the law course of the University of Jena, became devoted to the practice of law, and later accepted the chair of jurisprudence at Jena and subsequently at Kiel. In 1804 he was made professor of criminal law in the University of Landshut, and soon after drew a criminal code for Bavaria. He became second president of the court of appeals at Bamberg in 1814, and three years later was made first president of the appeal court at Anspach. Among his publications are "On the Crime of High Treason," "Remarkable Criminal Trials," and "Contributions to the Art of Law Making."

FEUILLET (fē-yā'), **Octave,** novelist and dramatist, born at Saint Lô, France, Aug. 11, 1821; died Dec. 28, 1890. He studied at Paris and for some time was a literary assistant to Dumas. Later he became a purveyor of novels and plays which in his judgment would prove agreeable reading, and in the meantime contributed to various newspapers and periodicals. In 1862 he was elected to a professorship in the French Academy. Among his writings are "A Marriage in High Life," "The Temptation," "Dalila," "The Sphinx," and "The Romance of a Poor Young Man."

FEVER (fē'vĕr), a disease or group of diseases characterized by an accelerated pulse and increased heat of the skin. Fevers usually commence with chills, loss of appetite, feeling of lassitude, pains in the back and limbs and nausea. They are classified into *continued* fevers, such as typhus or typhoid; *intermittent,* occurring at regular periods; *remittent,* such as yellow fever; and *eruptive* fevers, as smallpox, measles, and scarlet fever. Fevers are commonly named from the ailments with which they are associated, as *lung fever,* which is connected with inflammation of the lungs. The temperature in a low fever usually ranges from 100° to 102°, which is not considered much above the normal, but in high fevers it frequently reaches 103° or even 105°. When the temperature excels 105°, it is considered dangerous and may prove fatal.

FEVERFEW, the common name of a perennial plant native to America and Europe, found near hedges and in waste places. It is allied to the wild chamomile, but has flat leaves and smaller flowers. The stem has many branches, is about two feet high, and has a strong aromatic smell. It was so named from its use as a medicine in treating ague and fever and is still used as a tonic and stimulant. A double flowering species is cultivated in gardens and a related plant yields the Persian insect powder.

FEZ, the largest city in Morocco, capital of the province of Fez and the principal seat of government in Morocco. It is situated in a valley of the Atlas Mountains about 100 miles east of the Atlantic and 85 south of the Mediterranean. The valley is fertile and is drained by the Fez River, on which the city is located. Ancient walls surround the principal part and the city consists largely of inconvenient houses. It has angular streets and extremely poor sanitary regulations. Among the public buildings are numerous mosques, one of which is the largest in Northern Africa. The palace of the Sultan is an ancient structure, but it is in a state of good preservation. Many of the edifices have fine porticos and are beautified by trees and gardens. The university, founded in 1859, is important as a seat of Moorish learning. It has a large library, botanical gardens, and about 850 students. Among the municipal utilities are a number of public parks and some modern facilities, such as telephones, sewerage, and tramways.

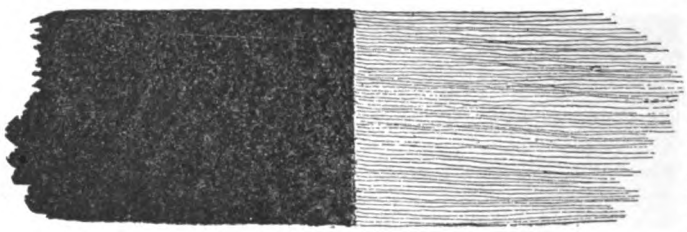
The commercial importance of Fez dates from times far remote, although domestic commerce is still carried on largely by caravans from and to the interior. The trade with Europe is extensive, the exports consisting largely of grain, live stock, fruit, and local manufactures. Among the manufactured products are leather, silk, woolen cloaks, fez caps, handkerchiefs, pottery, and utensils. Fez was founded in 793 A. D., by Edris II. It was the capital of an independent state from 1202 until 1548, during which period it attained widespread prosperity, and was long famous as a seat of Arabian learning. The inhabitants consist mostly of Moors, Arabs, Jews, Berbers, and Negroes. Population, 1918, 141,385.

FEZ, a kind of brimless hat made of fine red wool, so named from Fez, Morocco, where it was first manufactured. It fits the head closely, has a blue or black tassel upon the crown, and is worn extensively by the Turks. The name *tarbush* is applied to it in Africa.

FEZZAN (fĕz-zän'), a state in Northern Africa, situated south of Tripoli and attached to it for governmental purposes. The length from east to west is 380 miles; width, 300 miles; and area, 110,000 square miles. The surface is hilly and is traversed by the Jebel-es-Soda or Black Mountains, which trend east and west 170 miles and are not elevated above 3,000 feet. Much of the interior is made up of small oases, but the northwestern part is a waterless plateau and the southern section is a desert. It is largely unproductive, owing to an excessively hot climate and the absence of sufficient rainfall. The domestic animals consist largely of goats, sheep, camels, and cattle. Among the chief agricultural products are cotton, barley, wheat, millet, tobacco, vegetables, and fruits. The government is administered by a lieutenant governor under the pashalic of Tripoli, hence it is a dependency of Turkey. Murzuk is the principal town, having a population of 7,250. The inhabitants consist chiefly of Tuaregs, Moors, Arabs, Berbers, and Negroes. Little advancement has been made in the industries and arts, many of the people being unable to read and write. Arabic is the chief language and Mohammedanism of the Sunnite sect is the prevailing religion. The Romans conquered the region in 19 B. C., when it was known as Phazania, and the people became Christians in the 6th century. In the 7th century it was conquered by the Arabs. Population, 1916, 72,380.

FIBER (fī'bĕr), or **Fibre,** a small thread, string, or filament of which the tissues of animals and plants are constituted. Asbestos is the only mineral fiber known. The utility of fibers in the arts and manufactures depends upon the length, structure, strength, and ability to retain colors in dyeing. Among the more common animal fibers in use are wool, silk, and furs (q. v.). Vegetable fibers are employed extensively in the arts and are obtained from different parts of a large number of useful plants. Cotton fibers surround the seed of the cotton plant. Jute, hemp, and flax fibers are obtained from the bark of plants. The husk of the cocoanut and the leaves of various palms are used for making rope and matting. In recent years the fiber of the sisal hemp has come into extensive use for binding twine and rope. Ramie, or China grass, corn husks, Esparto grass, broom corn, Spanish moss, and vegetable sponge furnish fibers for manufacturing purposes. A

majority of the finer textile fibers are obtained in the Temperate zones, but the larger number of fibers come from the warmer countries. See **Cotton, Linen, Paper.**



FIBER OF HEMP.

The light part shows the fibers after the pulp has been scraped off by a knife or stripping machine.

FIBRIN (fī'brĭn), a white proteid compound obtained when blood is coagulated, as by stirring fresh blood with a bundle of twigs. The fibrin, adhering in fibrous layers, is washed with water to remove the coloring matter. It is insoluble in water, but dissolves in an aqueous solution of nitrate of potassium, when heated to 40° Fahr. Normal human blood contains 2.55 per cent. of fibrin. Vegetable fibrin is a nitrogenous substance resembling animal fibrin, and is separated from the seeds of cereals and other plants.

FICHTE (fĭk'tę), **Johann Gottlieb,** famous philosopher, born in Rammenau, Germany, May 19, 1762; died in Berlin, Jan. 27, 1814. He descended from a family noted for piety and solidity of character. By mere accident Baron Miltitz observed his remarkable mental vigor and placed him in charge of Pastor Krebel at Niederau, where he was prepared for higher instruction. He entered the University of Jena as a student of theology and later took a course in philosophy. In 1790 he settled in Leipzig, where he married Johanna Maria Rahn, and the following year met Kant, which proved the most important event of his life. He soon attracted attention of the latter and won his close friendship. Subsequently he was elected to the chair of philosophy at Jena, later at Erlangen, and still later became rector of the University at Berlin. Under an appointment of the king, he prepared a constitution for the latter institution, and in the line of duty became associated with such men as Schleiermacher, Humboldt, DeWette, Neander, and Schlegel. The latter part of his life was devoted largely to lectures, and, when the vast movements for German national independence became spontaneous, he contributed support by making many fervid addresses.



JOHANN G. FICHTE.

The achievements of Fichte did not lead to the establishment of a distinct school of philosophy, but his teachings and writings have influenced the educational aspect of all civilized peoples. He taught that each individual creates a *world* for himself, in which his life and activities are paramount, but, as a matter of convenience, we are inclined to accept as true the same phenomena which are observed by the senses of others. God, being everywhere manifest, is the finite personality. He considered selfishness the root of all evil, since it limits the *world* of each individual and hinders the free activity of the *self*. Among his celebrated works are "Critique of Revelation," "The Nature of the Scholar," "The Vocation of Man," "The Way to a Blessed Life," "Characteristics of the Present Age," "The Vocation of the Scholar," "Our Belief in a Divine Government of the Universe," and "Introduction to the Theory of Science." Thomas Carlyle and a number of other writers translated from Fichte. Several of his works on education are considered excellent authority and are quoted frequently by educators.

FICHTELGEBIRGE (fĭk'tęl-gę-bêr-gę), a mountain range of Germany, on the northern frontier of Bavaria, about midway between the Bohmer Wald and the Erzgebirge. It has a general elevation of 3,000 feet, but Schneeberg, the highest peak, is 3,415 feet above the sea. This range of mountains separates the affluents of the German Ocean and the Black Sea, being the source of the Naab, the Main, the Saale, and the Eger. Much of the surface is covered with firs and pine. Copper, lead, and iron ores are mined extensively.

FIELD (fēld), **Cyrus West,** merchant and scientist, born in Stockbridge, Mass., Nov. 30, 1819; died in New York City, July 12, 1892. After receiving an education in the public schools, he went to New York City, where he secured a position as clerk in a dry goods store at a small salary. In 1840 he established himself as a paper manufacturer. He retired from business in 1853, traveled in South America, and, on his return the following year, began to study oceanic telegraphs. After numerous unsuccessful attempts, he finally succeeded in securing a charter for a telegraph line from New York City to Europe by way of Newfoundland. He devoted thirteen years to this enterprise, in enlisting interest and having the work done, and in the meantime crossed the Atlantic fifty times.

The telegraph line to Newfoundland was the first to be completed, receiving his personal

supervision, and in 1857-58 he accompanied the expedition to lay the cable in the Atlantic Ocean from Newfoundland to Europe. The enterprise was consummated with entire satisfaction in July, 1866. In laying the cable, the *Great Eastern,* then the largest vessel afloat, was used. Congress voted him a gold medal for his achievement and he received various decorations from several European countries. Communication between the two continents has never been interrupted since this line was completed. Later he promoted the construction of the elevated railroads in New York City. He erected a monument to the memory of Major John Andre at Tarrytown, N. Y., but it was subsequently destroyed by people who were prejudiced against Major Andre. His faithful lifework was recognized by the civilized world, but financial embarrassments embittered his closing years.

FIELD, David Dudley, jurist, born at Haddam, Conn., Feb. 13, 1805; died April 13, 1894. He studied at Williams College, was permitted to the bar in 1828, and took up the practice of law in New York City. In 1847 he was made a commissioner on practice and pleadings, and the Legislature enacted as a law the work reported by the commissioner, entitled "Codes of Civil and Criminal Procedure." Later he was made the head of a commission to prepare a political code, a civil code, and a penal code, and these were completed in 1865. His greatest work is entitled "Outlines of an International Code," which was translated into Chinese and several European languages, and was the basis of reforms in codifying the laws of several nations. In 1876 he was elected to Congress as a Democrat. Among his later publications are "The Electoral Votes of 1876" and "Speeches and Arguments Before the Supreme Court of the United States."

FIELD, Eugene, journalist and poet, born in Saint Louis, Mo., Sept. 3, 1850; died in Chicago, Nov. 4, 1895. He entered Williams College in 1868 and later attended Knox College, Galesburg, Ill. His higher education was secured at the State University of Missouri, and, after traveling abroad, he engaged in newspaper work in 1873 with the Saint Louis *Journal.* Later he held editorial positions on papers published at Saint Joseph, Saint Louis, Kansas City, Denver, and Chicago. In connection with the Chicago *Morning News,* now the *Record-Herald,* appeared his best journalistic work, in a column called *Sharps and Flats.* As a platform reader of his own productions he stood in high repute, and while preparing for a trip of this kind he died quite suddenly. Eugene Field, as a joker, was practical, bold, and showed a spirit of enjoyment that made him universally popular. Among his productions for children are "Little Boy Blue," "Seein' Things," "Jes' 'Fore Christmas," and "Wynken, Blynken and Nod." These writings caused him to be styled the "Poet Laureate of the Children." His best known published works include "The Second Book of Verse," "Love Songs of Childhood," "Echoes from the Sabine Farm," "A Little Book of Western Verse," "The Gradual Rise of Literature in Chicago," and "A Book of Profitable Tales." The most delicately humorous essays of Field are contained in "The Love Affairs of a Bibliomaniac," and his best verses for children are in "With Trumpet and Drum."

FIELD, Kate, actress and journalist, born in Saint Louis, Mo., in 1840; died May 19, 1896. She studied at Boston and in Europe, and while abroad corresponded to various American newspapers and magazines. In 1874 she played as *Peg Woffington* at Booth's Theater in New York City and followed a stage life for some time. Subsequently she lectured and published a weekly under the name of *Kate Field's Washington.* Her writings include "Ten Days in Spain," "History of Bell's Telephone," "Agnes Ristori: A Biography," and "Penned Photographs of Charles Dickens's Readings."

FIELD, Marshall, business man, born in Conway, Mass., in 1835; died Jan. 16, 1906. At an early age he engaged as clerk in Pittsfield, Mass., and in 1856 went to Chicago as clerk in a wholesale dry goods establishment, in which he became partner in 1860. In 1865 he joined the firm of Field, Palmer & Leiter, from which Palmer retired in 1867 and I. L. Leiter retired in 1881, and the firm was reorganized as Marshall Field & Co. This house developed the largest retail and wholesale business of the kind in the world. It maintained its headquarters in Chicago and established branch offices in England, Germany, and France. The University of Chicago received real estate valued at $200,000, but since then it has greatly increased in value, and he made a gift of $1,000,000 to establish the Field Museum of Natural History, Chicago, in which may be seen many exhibits that were at the World's Columbian Exposition. By his will he bequeathed the institution the further sum of $8,000,000, half of which was assigned to erect a new building and the balance for endowment.

FIELD, Stephen Johnson, famous jurist, born in Haddam, Conn., Nov. 4, 1816; died in Washington, D. C., April 9, 1899. He was the brother of Cyrus West Field, secured a primary education at Stockbridge, Mass., and at the age of thirteen accompanied his sister on missionary work to Greece and Smyrna, where he remained three years and secured many advantages in learning Greek and other languages. On returning to the United States, he studied at Williams College, from which he graduated in 1837, and engaged in the practice of law in New York City. In 1848 he traveled in Europe and the following year settled in Marysville, Cal. He was elected to the Legislature the same year, in 1857 became a judge of the supreme court of California, and in 1863 was ap-

pointed by President Lincoln to the supreme bench of the United States, though belonging to the Democratic party. In 1869 he was chosen professor of law in the University of California, and in 1873 the Governor appointed him to codify and suggest amendments to the State laws. He was a member of the electoral commission in 1876 and voted with the Democratic minority. The national Democratic convention held in Cincinnati, in 1880, cast 65 votes for him as a candidate for the presidential nomination. Justice Field served longer than any other supreme court justice, the total time of service being 34 years and six months. According to a statement made by himself, he wrote 57 opinions in the circuit court, 365 in the supreme court of California, and 620 in the Federal Supreme Court, making a total of 1,042. He was an opponent of encroachments by corporations and a friend of personal liberty, and stood fearless in his opinions irrespective of policy or pressure.

FIELD GLASS, a small binocular, portable, terrestrial telescope for determining the exact distance of an object from the observer. It is used largely in armies to ascertain the distance of the enemy, and to range the guns on the basis of observations made by means of it. The common field glass resembles the telescope made by Galileo, having a large object glass to secure a brilliant image and a negative, or concave, eyeglass. An achromatic telescope, having from three to eight joints, being from fifteen to thirty inches long, is designated by the same name.

FIELDING (fēld'ĭng), **Henry,** noted novelist, born in Sharpham Park, England, April 22, 1707; died in Lisbon, Portugal, Oct. 8, 1754. He was the son of Gen. Edmund Fielding, secured an education at Eton and Leyden University, and turned his attention to the stage. The first dramatic production from his pen is entitled "Love in Several Masks," written in 1728, and was received with favor. Shortly after he became the manager of a theater, studied law, and edited several periodicals. He married Miss Craddock in 1737, by whom he came to be the possessor of some means, and the death of his mother occurring about the same time also brought a small estate in Dorsetshire into his possession. Among the chief merits of Fielding as a writer are his well-applied humor, witty pleasantry, and correct knowledge of character. His principal writings include "Joseph Andrews," "History of Tom Jones," "Journey from This World to the Next," "Don Quixote in England," "The Modern Husband," "Journal of a Voyage to Lisbon," "Temple Beau," and "History of Jonathan Wild."

FIELD OF THE CLOTH OF GOLD, the name of the place where Francis I. of France and Henry VIII. of England met from June 7 until 20, 1520, for an interview. The locality of the meeting is on a plain between Arde and Guisnes in the department of Pas-de-Calais. It was so named from the splendor of the banquets and the gorgeous trappings and apparel used by the participants. The meeting occured because Francis I. sought the friendship of Henry VIII, against Charles V. of Germany, but in this he was not successful. Interviews took place shortly after at Calais and Gravelines between Henry VIII. and Charles V. Shakespeare gives a graphic description of the meeting on the Field of the Cloth of Gold in his "Henry VIII."

FIELDS, James Thomas, author and publisher, born at Portsmouth, N. H., Dec. 31, 1817; died April 24, 1881. He attended the public schools in his native town and in 1834 removed to Boston, where he engaged in the business of publishing. For a number of years he edited the *Atlantic Monthly* and he was the publisher of Holmes, Emerson, Longfellow, Lowell, Hawthorne, and Whittier. After 1870 he devoted his time almost exclusively to lecturing and writing. His books include "Yesterdays with Authors," "In and Out of Doors with Charles Dickens," and "A Few Verses for a Few Friends."

FIERY CROSS (fī'ĕr-ў), a cross made by the Highlanders of Scotland, who called it the *Crantara.* It was constructed of light, dry wood and the extremities were burned to a char, after which the fire was extinguished by dipping in the blood of a goat. The Fiery Cross was carried from place to place as a signal for men to hasten to arms in defense of their country.

FIFE (fif), a small, shrill-toned, martial instrument, either of wood of metal, in the form of a tube, having fingerholes and a blow-hole or mouthpiece. It is variously pitched, usually from D on the fourth line of the treble staff upward, and the compass is two octaves. The notes are shrill and somewhat harsh. Fifes and drums have been a source of much inspiration in the army during long marches and are still held in high esteem.

FIFTEEN DECISIVE BATTLES. See **Battle.**

FIG, a small fruit tree native to Asia Minor, but now cultivated in all the countries adjacent to the Mediterranean. About 300 known species are recognized, most of which are characterized by large leaves. Some are trailing vines and others are great trees. The average height of the fig tree grown for its fruit is about twenty feet. In favorable climates it produces two crops of figs yearly, in the spring and autumn. The fruit is a fleshy receptacle of a conical form. It is attached to the twig by the narrow end. At the larger end is a small opening as in a pear, the flower and seeds lining the interior. The fig is used as food and is employed in medicine as a demulcent and laxative. In a fresh state for table use it can be transported only

a short distance, hence it is dried extensively and packed in boxes for the market. Dried figs form an important article of commerce, the best grade being imported from Turkey and the Levant. However, the culture of the fig has been extended very largely the past few



FIG.
A, Female Flower; *B*, Section of Fruit.

decades, especially in Australia and California, where the quality of the fruit is thought to be equal to that of Smyrna.

FIGARO (fē-gȧ-rō'), the name of a journal issued in Paris, France, celebrated for publishing contributions from Jules Janin, Jules Sandeau, George Sand, and a number of other able writers. It was so named from the comedies of Beaumarchais entitled "The Marriage of Figaro" and "The Barber of Seville." The name was afterward adapted by Mozart and Rosini, by the former in his "Marriage of Figaro" and by the latter in his "Barber of Seville."

FIGHTING FISH, a small fish allied to the perch family, so named because it is used in captivity for fighting purposes. It is a small fish and is kept in glass globes. The color is dull, when the fish is quiet, but assumes a metallic luster when it becomes excited. Fighting fishes are native to the southeastern part of Asia, where they are used for gambling purposes. They attack each other immediately on coming in contact, hence much money is spent in betting on the result of the contest.

FIGHTING JOE. See **Hooker, Joseph.**

FIGURES OF SPEECH, the variations of the literal or ordinary form of expression, the intention being to make the thought more attractive or more striking. The principal figures of speech include the simile, metaphor, allegory, personification, antithesis, synecdoche, apostrophe, hyperbole, climax, and irony. They are usually divided into figures of rhetoric, figures of etymology, and figures of syntax. Figures of *rhetoric* are used extensively in poetical composition, being figures of thought rather than of grammatical form. Figures of *etymology* refer to the forms of words, as in the use of *o'er* instead of *over,* while figures of *syntax* have reference to variations in the construction of sentences.

Simile is an expression of resemblance between two different things, as in the sentence, "Religion is to the soul what life is to nature." *Metaphor* is another figure which is founded upon the resemblance of one thing to another, but it differs from simile in that the expression is implied instead of being formally expressed. "Life is like an isthmus between two eternities" is a simile, while "Life is an isthmus between two eternities" is a metaphor. *Allegory* is founded upon resemblance, but the comparison is more extended than in simile and metaphor. It is designed to teach some abstract truth by the use of symbolic language, hence is in the nature of a short fable or parable. *Personification* consists in attributing life to inanimate things, as in the sentence, "The hungry flames swept onward." *Antithesis* is founded upon unlikeness, in which things are contrasted or opposed to each other. The expression "Science is deep as eternity; speech is shallow as time," is antithetical. *Apostrophe* is direct address to the dead as if they were living, or to the absent as if they were present. A figure of *synecdoche* consists in putting a part for the whole, or the whole for a part, as in the example, "Give us this day our daily bread." *Hyperbole* is an exaggeration, as in saying "I am tired to death." *Climax* is an ascending series of thoughts or statements which gradually increase in importance, as in "Liberty was lost,—all was lost!" *Irony* is disguised satire. We make use of this figure when we praise a thing and really mean to ridicule it.

FIJI ISLANDS (fē'jē), an island group in the South Pacific Ocean, consisting of about 250 distinct islands, of which one-third are inhabited. They are situated 7,450 miles from San Francisco, east of the New Hebrides, and have an area of 8,050 square miles. The two largest are Vanua Levu and Viti Levu, the former having an area of 2,600 square miles and the latter, 4,250 square miles. Most of the islands are of volcanic origin, but the group contains many atolls and coral reefs. Volcanic action and earthquakes are not infrequent. The climate is healthful, the soil is productive, and the natives have become largely educated and Christianized. Among the principal products are live stock, maize, cotton, copra, sugar, peanuts, tobacco, pearl shells, and fruits. The government maintains two public schools and an industrial institute, at which about 200 pupils attend. The Wesleyan missionaries direct almost entirely the educational affairs, their

schools numbering 2,075, at which 35,500 pupils attend. Besides these, there are 145 schools of the Roman Catholic mission, at which 2,150 pupils are enrolled.

The Fiji Islands present one of the most favorable examples of effective Christianizing, fully 110,000 of the inhabitants being Christians, while not more than 75 years ago the natives ranked as the fiercest of cannibals. Abel J. Tasman (1602-1659), a Dutch navigator, discovered them in 1643, and Captain Cook cruised among them in 1773. An influx of European settlers began in 1866, principally from Australia and New Zealand, and soon after the commercial interests of the Fijis grew to importance. Since 1874 they have been formally governed by Great Britain as the Fiji Colony. Suva, on the south coast of Viti Levu, is the seat of government. The inhabitants consist chiefly of Fijians, Indians, Rotumans, and Europeans, the last mentioned numbering 2,459. Population, 1916, 135,085.

FILE, a steel instrument for abrading or smoothing surfaces, having raised cutting surfaces or teeth made by indentations of a chisel. Files are of various shapes, sizes, and fineness of cut. Those in common use are either flat or triangular in form. They are said to *taper* when they are thinner toward the point; to be *parallel,* when they are of the same dimension throughout; and *blunt,* when they grade between a taper and a parallel. Some types are square, round, or half-round. They are either single-cut, having but one row of teeth, or double-cut, having two sets of teeth crossing each other obliquely. A *rasp* is a similar instrument, but has coarser teeth and is used on soft materials, such as wood and the hoofs of horses. The file is one of the most ancient instruments, and is mentioned as early as 109 B. C. Only high grade steel is used in manufacturing files. The cutting and tempering involve much skill and the use of complicated machinery.

FILEFISH (fīl'fĭsh), a class of small fishes native to the tropical and temperate waters, so named because the stout dorsal spine is armed with two rows of barbs, giving the appearance of a file. Both jaws are furnished with teeth, each having eight teeth in a row, and the body is covered with hard rhomboidal scales. The *barnacle eater,* a species of filefish, occurs in the Atlantic off New England and Newfoundland. It attains a length of eighteen inches, has a tawny color, and is frequently seen in aquariums. A species native to the Mediterranean is about two feet long. The filefish is allied to the trigger fishes.

FILIBUSTER (fĭl'ĭ-bŭs-tēr), a name applied originally to the pirates of the West Indies. The word is of Spanish origin, in which language it designates a fast-sailing vessel or flyboat. It came to be the name of the adventurers who organized expeditions in the United States to gain control of West Indian and Central American regions with the hope of having them annexed to the United States, and thus to extend the slave territory. Gen. William Walker, who was captured, court-martialed, and shot Sept. 12, 1860, was the most noted of the filibusters. The term *filibuster* has been introduced recently to designate the members of the minority of a legislative body, who seek to delay or defeat the adoption of measures obnoxious to them by raising questions of parliamentary law, making motions to adjourn, or calling for yeas and nays.

FILLMORE (fĭl'mōr), **Millard,** thirteenth President of the United States, born in Summer Hill, N. Y., Feb. 7, 1800; died in Buffalo, March 8, 1874. He descended from a family which was distinguished in the French and Revolutionary wars, worked with his father on the farm, and in 1815 was apprenticed for a few months to a carder and cloth dresser. Shortly after he taught school, but studied law in the meantime. In 1823 he was admitted as an attorney to the court of common pleas in Erie County, and in 1830 began a successful law practice at Buffalo, N. Y. His political career began and ended with the birth and extinction of the Whig party. In 1828 he was chosen to the Legislature, where he served three terms, and in 1832 was elected to Congress, securing reëlections in 1836, 1838, and 1840. He failed in obtaining the nomination for Vice President in the Whig convention at Baltimore in 1844, but was nominated for Governor of New York, for which office he was defeated by Silas Wright.



MILLARD FILLMORE.

The Whigs nominated Fillmore for Vice President in 1848 on the ticket with Taylor, and he became President on July 10, 1850, at the death of the President. An effort to nominate him for President in 1852 failed, General Scott defeating him in the convention. He made an extended visit to European countries in 1856, and while at Rome was nominated for President by the American, or Know-Nothing, party, but received only the electoral votes of Maryland. His home was at Buffalo after retiring from the Presidency, where he established the Buffalo Historical Society and frequently presided over conventions and public meetings. The important event in his time of service in the Legislature of New York, in 1829-31, was the abolition of imprisonment for debt under a bill written by him. During his Presidency the

country was prosperous and at peace. The passage of the Omnibus Bill was the most noted event of his administration.

FILTRATION (fĭl-trā'shŭn), a process by which solid particles are separated from a liquid by causing the latter to pass through porous substances, which retain the solid particles or impurities. In constructing a filter it is necessary to use materials that contain interstices or pores through which the liquid may pass, but they must be sufficiently fine to retain the solid particles. Ordinary plans for filtering may be illustrated in a device utilized in constructing cisterns, in which the water is passed through a porous substance, such as sandstone, brick, charcoal, silicated carbon, wood, gravel, powdered glass, or others by which the solid particles may be retained. The most serviceable plan is to conduct the water through a pipe to the filter, which is commonly made of various layers, such as sand, gravel, charcoal, and other substances alternated, and, after passing through them, it is dropped into the cistern or tank beneath. A partition wall of brick, through which the water passes, is not an uncommon form, the water being dropped in on one side of the wall and drawn out for use at the other side.

In order to preserve a good sanitary condition it is necessary to have the filter constructed in such a way that it may be removed and cleansed or replaced by other substances at least once or twice a year, otherwise the pores become clogged, or the mass solidifies by the particles retained, and thereby it becomes inoperative or impure. In filtering oils, syrups, ale, beer, and other similar substances it is customary to use horsehair, cloth, felt, skins, cane, clay, wool, capillary threads etc., this depending upon the character of the liquid to be purified. Charcoal made of bones is much more serviceable than wood charcoal, since it removes both the solid matter and many gases, and is utilized to reduce the color of alcoholic beverages and to whiten sugar. Mechanical devices are now used extensively to clean the water in tanks and cisterns. They are placed in the water and, by manipulating a valve, the entire body is forced through a small filtering cylinder, by means of which the particles become separated and are thrown out. However, it must be borne in mind that filtration removes only substances suspended mechanically in the liquid, while impurities or foreign substances existing in a dissolved state can be removed only by distillation. See **Distillation.**

FINCH, the popular name of various small birds, many of them having fine plumage and a beautiful song. They are usually called *hard-billed* song birds to distinguish them from the warblers or *soft-billed* songsters. Not less than 550 species have been described, of which 135 are found in Canada and the United States. Various species of the finches inhabit nearly all parts of the globe, except Australia, but they are most abundant in the Northern Hemisphere. They are variously known as bullfinch, chaffinch, hawfinch, and pinefinch. These birds may be distinguished by their strongly formed bill, suitable for crushing seed, which is their favorite food.

FINCK, Henry Theophilus, musical critic, born in Bethel, Mo., Sept. 22, 1854. He removed with his family to Portland, Ore., at an early age, where he attended school and studied music. After studying Latin and Greek by himself, he entered Harvard University in 1872, where he pursued the study of music, philosophy, and the classics. Later he studied at Berlin and Heidelberg, and in 1881 engaged as musical editor of the New York *Evening Post.* In the theories of music he supported Wagner, of whose compositions he was the leading advocate in the United States. Among his published works are "Pacific Coast Scenic Tour," "Wagner and His Music," "Chopin, and Other Musical Essays," "Romantic Love and Personal Beauty," "Lotus Time in Japan," "Pictorial Wagner," and "Songs and Song Writers."

FINDLAY (fĭnd'lā), a city in Ohio, county seat of Hancock County, on the Blanchard River, about 42 miles south of Toledo. It is on the Big Four, the Cincinnati, Hamilton and Dayton, the Lake Erie and Western, and other railroads. The surrounding country has extensive deposits of petroleum, natural gas, and fire and potter's clay. Among the noteworthy buildings are the county courthouse, the city hall, the public library, and the high school. It is the seat of Findlay College (Church of God) and has a hospital and an orphans' home. Among the manufactures are vehicles, machinery, ironware, earthenware, clothing, glass, baskets, flour, pottery, and stoves. It is the focus of several electric interurban railways. The city has waterworks, pavements, sewerage, and a public park. It was incorporated in 1837. Population, 1900, 17,613; in 1910, 14,856.

FINE ARTS. See **Art; Architecture; Sculpture,** etc.

FINGAL'S CAVE (fĭn'gąls kāv), a celebrated natural cavern on the island of Staffa, off the western shore of Scotland. The basaltic columns consist of immense dikes with diversified though symmetrical forms, and are joined to the rocks with much beauty. At the entrance it is 42 feet wide and at the end it has a width of 22 feet. It is 227 feet long. The height of the arched roof is 65 feet. The cave can be entered by small boats, since the low-water mark in the cave is about 20 feet. This cavern presents one of the most picturesque of the many nonvolcanic igneous eruptions found in the earth's crust.

FINLAND (fĭn'ląnd), a grand duchy of Russia, in the northwestern part of Europe, with an area of 144,550 square miles. It is bounded on the north by Norway, east by the governments of Archangel and Olonetz, south by the

Gulf of Finland, and west by Sweden and the Gulf of Bothnia. The region includes many lakes and marshes, the largest of the lakes being Kalla, Enare, Tornea, Saima, Päyänne, and Ladoga. Many of these lakes are connected by canals, whereby commercial enterprise has been greatly facilitated. The railroads, with a total of 2,090 miles, are under government control and furnish connection with all the important commercial centers. The rivers are unimportant, and no great mountain elevations exist. It has vast forests of conifers and oaks, which cover about one-third of the land surface, though coal and extensive fossils do not abound. Granite, copper, and iron ore are the chief minerals. Among the chief agricultural products are wheat, oats, rye, and barley. The climate is affected by the adjacent water surface, rendering it suitable for the production of pears, apples, cherries, and small fruits, but the larger species thrive only in the southern portions. Many of the lakes and streams abound with salmon, trout, perch, pike, and other food fish. All the domestic animals common to Europe are reared with profit, especially cattle, horses, sheep, and swine. The principal exports are fish, meat, leather, textile fabrics, lumber, and grains. Coal, raw cotton, and foodstuffs are imported. The largest share of trade is with Sweden, Russia, and Germany.

GOVERNMENT. The executive authority is vested in the Czar of Russia, who is the Grand Duke of Finland. A new constitution went into force in 1907, under which the legislative function is exercised by a diet of 200 members, who are elected by universal suffrage without distinction of sex. The state of education, like that of the Scandinavian countries, is on a high plane of efficiency, and greatly excels that of any other portion of Russia. Nearly the entire population is able to read and write, the result of compulsory attendance laws and a free school system for both sexes. Helsingfors is the seat of literary life and impulse. A university supported by government grants is maintained at Helsingfors, which has an attendance of 2,350 students.

INHABITANTS. The people consist mostly of Finns, whose language, the Finnish, is generally spoken, but the higher classes generally speak Swedish. Lutheran, the established religion, is the faith of practically the entire population; only 48,500 belong to the Greek Church. Only a small per cent. of the inhabitants are Russians, but the country has a considerable number of Swedes, Lapps, and Germans. Helsingfors is the capital and chief city. Other cities include Abo, Tammerfors, and Wiborg. Population, 1915, 3,265,876.

LANGUAGE. The Finns are allied to the Magyars of Hungary and the Laplanders, and differ in language and habits from the Russians and Swedes. The language is classed with the northern division of the Turanian or Uralo-Altaic family, which is spoken by the people of Lapland, Olonetz, and Archangel. Their literature is valuable on account of the richness and beauty of its poetry, and the language is not only agreeable, but has a wealth of vowels and diphthongs, and is uncommonly flexible. Within recent years several lexicons and treatises on their history, language, and literature have been published, while their tongue is taught in many of the higher educational institutions.

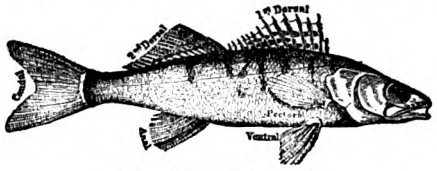
HISTORY. The Finns had independent chiefs up to the 12th century and were a warlike people. They were conquered by the Swedes about 1150 and their conversion to Christianity followed soon after. Peter the Great of Russia secured a portion of their territory by treaty in 1721, and Russia conquered the remainder from the Swedes in 1809, since which time it has belonged to that country. In 1903 the privilege of autonomy was removed, but it was restored in 1905, at the time of the general strike in Russia. At the same time woman suffrage was established. In 1917 it declared its independence from Russia.

FINLAND, Gulf of, an extensive arm of the Baltic Sea, extending to the east between Finland on the north and the Russian governments of Saint Petersburg and Esthonia on the south. The width is from 10 to 75 miles and the length is 250 miles. It receives the outflow from Lakes Ladoga and Onega. Within the gulf are numerous islands, sandbanks, and shoals. The Russian government maintains several forts on the gulf. The shores are rocky and precipitous and the waters only slightly salty. It has a number of fine harbors, including those of Wiborg, Kronstadt, Reval, and Helsingfors.

FINNEY (fĭn'nĭ), **Charles Grandison,** clergyman, born in Warren, Conn., Aug. 29, 1792; died in Oberlin, Ohio, Aug. 16, 1875. Being licensed to preach in 1824, he soon entered upon evangelistic work and attained marked success in Troy, Utica, Boston, Philadelphia, and New York. In 1835 he became professor of theology at Oberlin College and was its president in 1851-66. Later he labored in Europe as a revivalist for three years. Among his publications are "Sermons on Important Subjects," "Lectures on Revivals of Religion," "Sermons on Gospel Themes," and "Lectures to Professing Christians."

FINS, the organs of fish which serve to propel, balance, or steer them in the water. They usually consist of rays of bones covered with an elastic membrane. The *pectoral* or breast fins, a short distance behind the gills, are modifications of the anterior limbs in other vertebrate animals, and the *anal* fins, near the anus, correspond to the hind limbs. The *dorsal* or back fins are from one to four in number, depending upon the species, and the *ventral* or belly fin usually is a modification of the skin.

The tail is known as the *caudal* fin. Fins are usually divided into *paired* and *unpaired,* the former including the pectoral and sometimes the anal and the dorsal. The term *fin* is often



FISH, SHOWING FINS.

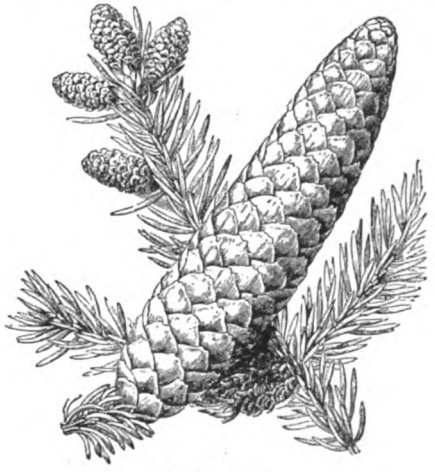
applied to the paddles of a whale, but never to the hind feet of seals or the webbed feet of birds.

FINSEN, Niels Ryberg, scientist, born in Denmark in 1861; died in 1904. He attended the University of Copenhagen, where he graduated in 1890, and founded a successful medical practice in that city. His success in treating diseases by the use of light rays, especially tuberculosis of the skin, caused the government of Denmark to aid him in founding near Copenhagen the Finsen Medical Light Institute. His successful experiments did much in extending the use of electricity in the medical profession. He was awarded the Nobel medical prize in 1903.

FIORD (fyôrd), or **Fjord,** a name first used by the Scandinavians in describing a narrow bay that penetrates inland, and which is characterized by steep, rocky walls. Inlets of this kind are very common in Norway, and are thought to have originated from the combined action of glaciers and waves. Sogne Fiord, the most notable fiord of Norway, extends inland about 100 miles, and for this entire distance has very high and precipitous walls of rock. Similar inlets occur on the coasts of Nova Scotia and New England, and they prevail more or less in British Columbia, Greenland, Patagonia, and New Zealand. The lochs and firths of Great Britain are in many respects similar to fiords.

FIR (fẽr), a name once used coextensively with the widest sense of the word *pine,* but now restricted by botanists to the one genus *Abies,* which includes the spruce fir, silver fir, Norway spruce, and other species. The trees of this genus belong to the family *Coniferae.* They are distinguished from the pines by the flat, rounded apex of the scales of their cones, and by leaves not in clusters of definite number. Fir trees are found in many parts of Eurasia and America, where they occur in fine forests, and the lumber and other products derived from them are important articles of commerce. From the *Norway spruce* is obtained lampblack, tar, turpentine, resin, and Burgundy pitch. The bark is used in tanning and for making baskets, the roots yield fibers for cordage, and the wood is employed for fuel, housebuilding, and making masts and spars of ships. In the market the wood of the Norway spruce is known as Christiania deal and Dantzic deal. The *white spruce,* or *white fir,* which ranges from Lower California to British Columbia, is one of the finest trees of that region and attains a height of 300 feet. *Hemlock* forms dense forests in the northern part of the United States and Canada, extending as far as Hudson Bay. The bark is valued for tanning, while the wood is used for construction purposes. In the northwestern part of North America is found the *Douglas fir,* often growing 250 feet high. Spruce beer is made from small branches of the *black spruce,* and Canada balsam is obtained from the *balm of Gilead fir.*

FIRDAUSI (fẽr-dō̄o̅'sẽ), or **Firdusi, Abdul Kasim Mansur,** epic poet, born near Tus, Persia, about 940; died in 1020. He is sometimes called Thousi from the place of his birth, but from his poems he is called Firdausi, which has reference to both garden and paradise. The Sultan Mahmud invited him to his court at Ghuznee, or Ghazni, where he came in contact with the most distinguished scholars and poets of his time. His great work, entitled "Shah Nameh," treats of the history of Persia from remote antiquity until the Mohammedan conquest in 641 A. D. It contains 60,000 verses, and is more than seven times larger than Homer's "Iliad." The "Shah Nameh" is the oldest poetic work of Persian literature, and is regarded by the Orientals as the highest



BALSAM FIR.

authority for the primitive history of Western Asia. It was adopted by the disciples of Zoroaster, and was translated into a number of European languages. Jacob Joseph von Görres (1776-1848) translated it into German and Jules Mohl made a French translation. An English translation was published in 1831.

FIRE (fir), the evolved heat and light produced by ignition or combustion. The vividly perceptible ascending stream or current exhib-

ited in the combustion of gases is called a *flame.* In ancient times it was regarded one of the four primary elements of which all things were thought to be composed, the other three being earth, air, and water. Among the ancients and even within comparatively recent times many superstitions regarding fire were common, such as led to fervid and devoted fire worship. Many uses of fire were known very early, though some of the common methods of producing and controlling it are quite recent. The newer methods include its production by inflammable matches and its extinction by chemical compounds, as by a mixture of dried ferrocyanide of potassium, chlorate of potassa, and sugar set in action by sulphuric acid, or by mechanical agencies.

FIRE ALARM (ā-lärm'), an apparatus for communicating warning of a fire, either electrical or mechanical. An automatic arrangement is now in use which depends for its action upon the increased temperature of the air in the vicinity of the fire, or of the burning away of certain connecting cords which are stretched in exposed situations. In large cities there are stations where any person discovering a fire may turn in an alarm by touching an electric button, which immediately gives the street and number of the house on fire, at the central station, whence relief may be speedily despatched.

FIREARMS. See **Cannon; Gun; Rifle,** etc.

FIREBALL. See **Meteors.**

FIRE CLAY, a variety of clay found in a stratum below the coal formations and sometimes elsewhere. It is used in the manufacture of brick, tile, gas retorts, and other vessels suitable to withstand high temperatures. The principal constituents of fire clay are silica and alumina, accompanied by small proportions of iron, lime, magnesia, water, and organic matter. Fire clay is found extensively in Canada and the United States and occurs in all the continents.

FIRECRACKERS. See **Fireworks.**

FIRE DAMP, an explosive coal-gas generated in coal mines, consisting chiefly of light carburetted hydrogen. When fire damp is mixed with from five to fourteen per cent. its volume of atmospheric air, it is explosive. It is very dangerous to miners, the principal protection being the safety lamp, though in most cases danger can be avoided by a good system of ventilation. Edison invented an electrical safety lamp which gives a strong light for several hours at a very trivial expense and, when any accident occurs to break the globe, the light instantly becomes extinguished.

FIRE DEPARTMENT (dē-pärt'mẹnt), an organization maintained in towns and cities as a means of protection against fires. This department of a municipal government is supported by general taxation and may be either paid or voluntary. A *paid fire department* is one in which the chief and his assistants are employed regularly on a salary, while a *volunteer department* is made up of members who serve only when called by a fire alarm, and they are paid only for the time they actually attend fires. Some cities maintain both classes of organizations, as a means of security during large conflagrations, and the volunteers are paid only for the actual time of service.

Paid fire departments are maintained in practically all towns and cities that have a population of more than 9,000, and those in charge as employees of the city give their entire time, both day and night, to the duties incumbent upon them. The smaller cities have a single fire station, while the more populous places have a central and several branch stations, where the fire engines, ladders, chemical engines, hose carts, and other supplies are kept ready for use. One or more teams of well-trained horses are kept ready for call in the stalls at the station. When an alarm is given by electrical devices, they take their places under the harnesses which are suspended in position before the engine or fire wagon, and the men, who promptly slide down poles from the room above, clasp the harnesses and are ready to start for the scene of the fire without delay. Hose are attached to the hydrant of the waterworks, which supplies the necessary pressure, or, where an engine is used, the pressure is obtained through it, and the water is pumped direct from the hydrant. In many instances chemical engines are used and in some cases the work is supplemented by a hook and ladder company.

FIRE ENGINE (ĕn'jĭn), a machine designed to throw water for the purpose of extinguishing fires. Mechanical devices for saving buildings and cities from destruction by fire were used more or less for many centuries, though it is only within recent years that they have been brought to a high state of efficiency. They are mentioned in Roman history by Pliny, and appear to have formed a part of the municipal facilities of Athens, Carthage, and Alexandria. Several mechanical devices for throwing water to considerable heights were used extensively in Europe in the 16th century, the most successful of which were built in Augsburg, Germany. Similar machines were constructed at Nuremburg in 1657 and at London in 1730. They came into use in the cities of Canada and the United States about 1731. At present some form of fire engine is a part of the necessary equipment for municipal protection, not only in every city, but in all the towns and hamlets.

Fire engines are a class of force pumps by which the water is subjected to a pressure sufficient to raise it to the necessary height, and are now generally worked by steam. In the smaller engines a cistern holds the supply of water, though in the larger a direct connection with the city water supply furnishes the neces

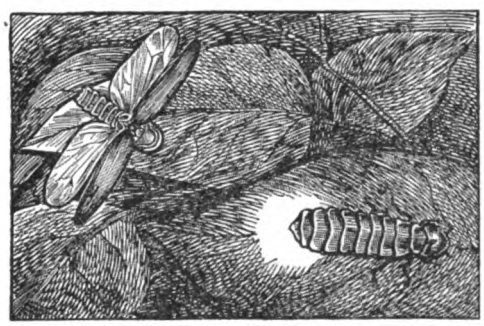
sary quantity to be rapidly thrown to great heights on burning structures. Steam fire engines have either rotary or piston pumps constructed on a single or double plan, with either tubular flue or coil boilers. The larger weigh about five tons, though engines weighing about three tons are preferred on account of greater facility in moving them hastily to the point of danger. The capacity of these engines is from 200 to 900 gallons per minute, the flow of water being controlled by an automatic relief valve.

Fire engines are commonly drawn by gasolene power, though steam is employed in the larger cities, with good results. The first fire engine to be propelled by steam was used successfully in New York City in 1873. Many seaports have fire engines that are mounted on fire boats. In smaller cities and villages chemical fire engines are used with good results. By these a stream of water from one fourth to three fourths of an inch may be thrown 200 feet by means of a chemical mixture with water, which produces carbonic acid gas and supplies the pressure necessary. A hose cart is used in connection with fire engines. It consists of a four-wheeled vehicle, supplied with about 1,000 feet of hose, and is moved along with the fire engine to the place of danger, but in many of the newer chemical engines the hose is carried on the engine itself. The hose is made of cotton fabric. It is usually lined within and covered without by rubber, though there are several varieties manufactured for the trade.

FIRE ESCAPE (ĕs-kāp′), a device for enabling persons to escape from the upper parts of high buildings. Most tall, modern constructions are provided with iron ladders extending from the top of the building to the ground on the outside of the brick or stone work. They are put up as the masonry is built. Ladders capable of being drawn out like a telescope are preferred in some classes of buildings. Rope ladders with hooks at one end are a part of the equipment of many of the more important hotels and of some travelers. In many cases large nets of stout sailcloth or slender ropes are utilized for lowering persons to the ground, or for them to jump into while held from the ground by the firemen. Persons weighing 200 pounds can safely jump one hundred feet into these nets. Some cities are provided with a cannon that shoots a projectile with a cable or rope attached over the building in which the danger occurs, and it is then fastened to form a means of escape. The construction and use of fire escapes are regulated by law in most countries.

FIRE EXTINGUISHERS (ĕks-tĭn′gwĭsh-ĕrz), the chemical agents utilized in extinguishing fires. Various compounds are recommended for the purpose, the most common being a mixture of chlorate of potassa, sugar, dried ferrocyanide of potassium, and water, and, when sulphuric acid is brought in contact with it, gases are liberated and the whole is directed to quench the flame. All rooms in first-class hotels, passenger cars, and passenger compartments in steamboats are supplied with bottles of chemical fire extinguishers, by means of which conflagrations may be averted by prompt action.

FIREFLY, the name commonly applied to all winged luminous insects. They abound in all the warmer latitudes, especially near wet and marshy grounds. Some have a steady glow, but most species, as they fly, emit and conceal their light with much regularity at intervals of three or four seconds. In most of these insects the light proceeds from the last three segments of the abdomen. An adult firefly is shown in the accompanying figure, together with a larva and a glow worm (q. v.).



GLOW WORMS.
Male winged. Female wingless.

In most species of elaters the larva is more or less luminous. The common firefly or lightning bug is not much over half an inch long. Some species found in the West Indies are larger and emit light so powerful that small print may be read by means of it, while a fair light may be secured by confining a number in a glass vessel. Several species native to the West Indies emit light from two eyelike tubercles on the thorax.

FIREPROOFING, a term used to describe the construction of buildings, treatment of portions of buildings, or apparatus by which they become partly or wholly invulnerable to damage by fire. The safeguards adopted early in the history of constructive building consisted of using brick or stone, and later iron entered into doors, lintels, and stairways. These and other methods are now in common use, while in large cities every building must be constructed according to certain specified conditions provided by the city authorities. Wood treated with silicate of soda is made largely proof against fire, since the application of strong heat fuses it into a kind of glass that forms a shield of protection. Cloth or wood does not blaze, if impregnated with certain saline substances, such as phosphate of soda or ammonia,

borax, alum, and many other chemicals. Cloth may be treated with graphite in a bath and then placed in an electro-metallic bath apparatus by which the cloth is coated with metal. Woolen and ordinary fabrics are rendered fireproof by being treated with borax, alum, or soluble glass.

Papers and valuable documents are preserved in fireproof safes, which are constructed with double walls, having the intervening space filled with a nonconductor of heat. In the tall buildings of cities marked precaution is taken in the construction of all portions exposed to view, and, as a further safeguard, metal shutters are used to protect the outside windows against the entrance of fire from a neighboring building while burning. Besides, water pipes extend from the basement to the upper story, these being connected with pumps below, and there are water buckets, hand grenades, and mechanical extinguishers for protection against incipient damage by fire. In many structures are stairways and openings by which entrance and passage of firemen to all parts of the building are facilitated. By these and similar means it is possible to protect and guard the larger centers of commerce against widespread fires, such as have destroyed portions of London, New York, Philadelphia, Chicago, and other cities at different times.

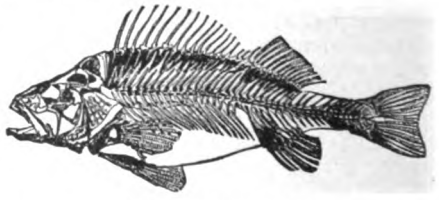
FIREWORKS, the common name of preparations containing combustibles and explosives, such as charcoal, niter, and sulphur, with chemicals producing colored lights or scintillations in burning, and used to make displays at festivals, expositions, or at times of public rejoicing. Many forms are made, according to the effects desired, such as crackers, rockets, squibs, Roman candles, torpedoes, balloons, wheels, and other arranged pieces. Some are contrived with ingenuity and skill, and, when ignited, represent various pictures and devices. The powder utilized in fireworks is made according to the same principle as gunpowder, but with it are used charcoal, niter, sulphur, and other substances to influence the explosive properties and give tint or coloring. Filings of zinc impart a bluish color, iron or steel filings increase brightness, while a greenish tint is secured by copper filings. Besides this class, such chemicals as salt, lampblack, amber, and resin are used.

The Chinese and Hindus manufactured fireworks many centuries before they became known to the Europeans, largely for the reason that they knew of gunpowder much earlier than western peoples. They utilized them at festivals and celebrations. Many of the different devices employed in producing noise and illuminations at night are of Chinese manufacture, though within recent years large establishments have been built in Europe and America at which all classes of fireworks are manufactured. The largest establishment of this character is located in New Jersey. Firecrackers are among the most popular devices used at celebrations. They consist of a tube made of strawboard, are from two to fifteen inches in length, and have a diameter equal to about one-tenth of the length. The newer process of manufacture has made it possible for one person to make about 2,500 tubes per day. These tubes are plugged with pasteboard wad, cord, or pith at one end and at the other with clay or wood pulp, and in the latter a fuse is placed. The explosive is on the interior and with it the fuse articulates. When finished, the firecrackers are covered with an artistic red paper, dried, and packed ready for the market.

FIRE WORSHIP. See **Parsees.**

FISCHER (fĭsh'ẽr), **Ernst Kuno,** noted philosopher, born in Silesia, Germany, July 23, 1824; died July 4, 1907. He studied in Posen, Leipzig, and Halle, graduating at the last named place in 1847. He became a teacher of philosophy at Heidelberg in 1850, but was deprived of the position three years later because the charge that he inclined to pantheism had been preferred against him. In 1856 he secured a chair at Jena and in 1872 succeeded Zeller at Heidelberg, where he aroused much interest in philosophical research. Among his principal writings are "History of Modern Philosophy," "Critique of Kant," and "System of Logic and Metaphysics." Several of his works have been widely translated and are used as texts in divers countries.

FISH, a group of vertebrate animals which live in water and breathe by gills. They are distinguished by having paired fins and by not breathing by lungs in any stage of life. Their



SKELETON OF FISH.

form is well adapted to permit them to move easily and rapidly through the water, tapering toward the extremities, but exceptions are numerous. The typical character of the skeleton is evidently homologous with those of quadrupeds and man. The four limbs belonging to the usual structure of vertebrate animals assume the forms of fins. Fins, gills, and, most generally, scales are distinguishing features of fish. The heart contains only one auricle and one ventricle, receiving venous blood only, and sending it to the gills, where it is oxygenated and passed by the dorsal vessel into the greater and only circulation. Fish, with few exceptions, are cold-blooded animals; that is, they have a temperature little above that of the water in which they

live. When taken from the water, they die in consequence of the drying up of the fine fringes of the gills.

In most fish the gills are situated at the back part of the sides of the head, usually four on each side, and consist of folds of membrane attached to the surface of the gill cavities, or a multitude of vascular membranous plates, generally in double fringelike rows fixed by the base. The gill orifices are covered by a bony plate whose motion expels the water, which is taken in by the mouth to supply the gills with air. Fishes possess nerves and organs of all the senses, although the senses of touch and taste are dull compared with those of many other animals. Some fish are destitute of sight, while most species have large eyes and a very acute vision. Others have no teeth, but many species have a large number. The air bladder, an organ aiding them to maintain an equilibrium in the water, is found in many kinds.

Fishes reproduce by means of *spawn,* or *eggs,* which, in some species, are fertilized in the body of the female and in others fecundation takes place at the time or after they have been extruded. The eggs are usually deposited in sand or gravel where the water is shallow. Many species leave the depths of the ocean and pass into fresh water for this purpose. A single codfish is said to lay nine million eggs. As a rule, they show no parental care either for their eggs or young, but some species build nests and watch over them. Fish, being cold-blooded, need no covering for warmth; hence, the scales serve for protection or as a defensive armor. While the skin of cartilagineous fish yields shagreen and the bladder of some fishes isinglass, by far their most important use consists in supplying man with food.

Many species known as *deep-sea fish* are very peculiar and formerly were not known to exist. Many of them have no eyes, for the reason that sunlight is absent from the depths at which they thrive. Their peculiar structure enables them to withstand the low temperature and enormous pressure that are common at great depths. They live almost, if not entirely, upon animal life, as plants do not grow without the influence of sunlight. Many of the species have extended mouths and dilatable stomachs, which enable them to swallow and digest bodies much larger than themselves, or strain out material from sediment that settles down from above. The fins and tail are long and delicate, because of the perfect calm at such depths. See **Fins.**

FISH, Hamilton, statesman and diplomatist, born in New York City, Aug. 3, 1808; died Sept. 7, 1893. He graduated from Columbia College in 1827, studied law, and in 1830 was admitted to the bar. Subsequently he was elected to Congress as a Whig, serving in the Lower House until 1845. He was Lieutenant Governor of New York in 1847-48, served as Governor of the State in 1849-51, and was elected a member of the United States Senate soon after. On retiring from Congress, he traveled in Europe several years, and received an appointment as United States minister to France. In 1869 President Grant made him Secretary of State, which office he filled with marked ability. Among a number of foreign disputes settled during his incumbency is the one relating to the Alabama claims.

FISH, Stuyvesant, capitalist, son of Hamilton Fish, born in New York City, June 24, 1851. He was educated at Columbia University, and in 1871 was appointed a clerk in the New York office of the Illinois Central Railroad Company. The following year he became secretary to the president of that company, was made a director in 1876, and held other important offices with other railroad companies. He was elected president of the Illinois Central in 1887, and did much to extend its lines and build up its business interests. In 1897 he was a member of the monetary commission created by the conference in Indianapolis. He was opposed in his official capacity as a promoter of the Illinois Central Railroad by Edward Henry Harriman and engaged in a long contest in 1907, but was outvoted by those holding stock.

FISH CULTURE (kŭl'tûr), the industry embracing the education and labor devoted to the growth and propagation of fish. The ancient Egyptians and Chinese were highly skilled in pisciculture and gave it marked attention, for the reason that the subsistence of large masses depended to a vast extent upon the food-producing qualities of their interior and adjacent waters. Since then the art may be traced through successive centuries. It is not difficult to realize the vast benefit that the industry yields to the people of Western Europe, and its wholesome influence upon the commercial aspects of America. Since the large fish feed upon the smaller, and the latter upon the eggs, it is apparent that these influences, in connection with the fishing industry, tend to greatly limit and ultimately depopulate the waters of the finny tribe.

The discoveries made by Stephen Ludwig Jacobi, of Westphalia, Germany, in 1748, led to the art of increasing fish by stripping the females of their eggs and fertilizing them by the milt taken from the male fish. From this discovery and those made later by L. J. R. Agassiz it became possible to breed and rear fish more extensively than had been possible previously, and by skillful application and care preserve, feed, and fatten them. We find as a result that waters before unproductive have been populated with various species, such as the California salmon, California brook trout, char, whitefish, shad, and German carp. Many streams and lakes have been populated with

fish, as the shad, which has been planted in the rivers of Georgia, and the whitefish fry has been introduced in Lake Erie. Besides, the waters of California, Canada, and many European countries have been restocked, and the more valuable kinds have been greatly increased in numbers.

Much advancement has been made in fish culture in the United States, where it is now pursued more extensively than in any other country. The industry is under the jurisdiction of the United States Fish Commission, a bureau established by act of Congress, Feb. 9, 1871. The primary object originally was to investigate the food fish of the seacoast and inland waters of the United States. Since then the duties of the bureau have been widely extended, and the whole now constitutes one of the most important functions in the service of the government. Many valuable reports and bulletins have been distributed annually, these relating to various branches in the different phases of the industry. They have been instrumental in disseminating accurate and scientific knowledge of the art. The several states have been supplied with various kinds of fish, the annual distribution often aggregating 200,000,000 eggs and fish, of which three-fourths are infant and adult fish and about one-fourth are eggs. At colleges of agriculture and other institutions under State and Federal control, such as are now quite common, the industry has been carefully studied. Along with fish culture proper, the artificial culture of lobsters, oysters, mussels, and other crustacea is growing in importance.

FISHER (fĭsh'ẽr), **George Park,** clergyman and historian, born in Wrentham, Mass., Aug. 10, 1827. He attended school at Wrentham, and graduated from Brown University in 1847. Subsequently he studied theology at Yale Divinity School and in Germany, and was professor of divinity in Yale from 1854 until 1861. In the latter year he became professor of ecclesiastical history in the same institution, in which he served with much efficiency a long term of years. He ranks as one of the leading Congregational clergymen and church historians of the United States. Among his publications are "History of the Reformation," "Discussions in History and Theology," "History of the Christian Church," "Faith and Rationalism," "Manual of Christian Evidences," "The Beginnings of Christianity," and "History of Christian Doctrine." He died Dec. 20, 1909.

FISHERY (fĭsh'ẽr-ў), the business of catching fish or other aquatic animals, but relating also to the locality where marine life and fish are found in paying quantities. The objects for which fishing is conducted include pearls, corals, sponges, whales, turtles, shellfish, seals, and many others, besides the various species of fin fish. Among the chief methods of fishing are those employing drawnets, spears, lines, and dredges. The most important of the fresh-water fisheries include those of the salmon, in which sportsmen employ fly hooks, while fishers generally use stakenets and drawnets. Other important fresh-water fish embrace the perch, eel, trout, pike, and catfish. Measured from the standpoint of profit, the oyster, cod, herring, and haddock are the most productive sea fisheries. Countries bordering on the sea naturally possess the most valuable fisheries, among which Canada and the United States take very high rank.

Disputes regarding fishery rights have taken on the form of international questions, and have occupied the attention of diplomats, especially those involving the United States and Great Britain at different times. The Bering Sea question, which occupied the attention of both governments for some time and attracted particular attention in 1896, is one of the most important. Under the fishery laws the owner of the soil and streams, or bodies of water, is entitled to the exclusive right to fish in such water. Where the owner has land adjacent to both sides of the stream, he enjoys the sole right to fish in the entire stream lying between his property, and, where his possessions are only on one side, his right extends to the center of the stream. In streams and bodies of water belonging to the State or Federal government the right to fish is abridged or authorized by general laws. In many of the states fishing is strictly prohibited, except at certain periods of the year, even in the bodies of water belonging to private owners, while in some it is made unlawful to fish with drawnets and to use more than two or three hooks on a line. Such legislation is deemed necessary in order to protect the waters from being totally depopulated, and to preserve a fair aggregate of the different kinds of fish at all times. Besides, damaging influences, such as dams, the discharged sewage, and other unwholesome and obstructive agencies, are prohibited under suitable penalty, and it is made the duty of officers to prosecute investigation for proper protection.

Newfoundland has some of the most valuable fisheries in the world, especially in cod, herring, and haddock. The Great Lakes yield whitefish, sturgeon and Michigan herring. Salmon are caught in large numbers on the Pacific coast, especially at the mouths of the Fraser and Columbia rivers. Manitoba and Minnesota are especially noted for the fisheries in hundreds of lakes. Rapid transportation by railways has made it possible to supply many sections of the country with fresh fish, even in the summer season.

FISH HAWK, an eagle or other rapacious bird which preys upon fish, as the bald eagle or the osprey. This genus of birds is widely diffused, being found both in warm and cold climates, and is grouped with the family Falconidae. It is singular among the falcons in preying exclusively upon fish, and to this end its whole structure and habits are adapted. The

fish hawk is about 22 inches long, and has a dark brown color variegated with gray and white. It has a short, broad, rounded bill, a long tail, expansive wings, and remarkably rough scaly, pointed toes, suitable for grasping its slippery prey. The feathers are destitute of supplementary plumes and very oily. These



OSPREY.

birds are found near the sea, lakes, or rivers, and are everywhere birds of passage, going toward the warmer zones soon after the appearance of frost. They catch their prey by diving into the water and grasping it with the talons.

FISK (fisk), **Clinton Bowen,** soldier and educator, born in Greigsville, N. Y., Dec. 8, 1828; died July 9, 1890. His parents removed to Michigan in 1830, where his father founded the town of Clinton. After studying at Albion and Ann Arbor, he settled in business, in Coldwater, Mich., and later in Saint Louis, Mo. In 1861 he entered the Union army, was promoted successively until he attained to the rank of brevet major general, and became a commissioner of the Freedmen's Bureau. Later he founded the Fisk University at Nashville, Tenn., an institution for the education of colored men and women, of which he was president until his death. Numerous educational and religious institutions received the benefits of his munificence. In 1888 he was nominated for president of the United States by the Prohibition party.

FISKE, John, historian and lecturer, born in Hartford, Conn., March 30, 1842; died July 5, 1901. In 1863 he graduated from Harvard University, studied law, and lectured at Harvard on philosophy and history. While attending that institution he was assistant librarian. He became recognized as a deep and forcible thinker and a powerful lecturer, by which he attracted the attention of both Darwin and Herbert Spencer. His special subjects in writing and lecturing were evolution and history, two themes in which he took marked interest. He lectured on American history at the University College and Royal Institute of Great Britain in the winter of 1879-80, where he became highly popular. After returning to America, he was appointed professor of American history in Washington University, Saint Louis, though he made his home at Cambridge, Mass. His contributions to the subject of evolution have attracted widespread attention, while those relating to the history of America are thoughtful, scholarly, and imperishable. Among his publications on evolution are "Myths and Myth Makers," "Destiny of Man," "Excursions of an Evolutionist," "Outlines of Cosmic Philosophy," and "Idea of God as Affected by Modern Knowledge." Those relating to history include "A History of the United States for Schools," "The War of Independence," "Beginning of New England," "American Political Ideas," "Civil Government of the United States," "Essays, Literary and Historical," and "Critical Period of American History."

FISKE, Minnie Maddern, actress, born in New Orleans, La., in 1865. She descended from a family of stage people, her father being Thomas Davey and her mother Lizzie Maddern, and in 1890 she married Harrison Grey Fiske. At the age of three years she appeared as the *Duke of York* in "Richard III." at Little Rock, Ark., and although she devoted much time to the stage her general education was carefully supervised. In New York she played successfully in "Hunted Down" and in "King John," and she toured in many parts of the United States. After her marriage she retired from the stage for rest and study for three years, after which she again followed stage life. She attained a reputation as a powerful actress in pretentious plays, and was particularly strong in sustaining emotion. Plays in which she succeeded best include "A Doll's House," "Marie Delroche," "Cesarine," and "A Light from Saint Agnes."

FISK UNIVERSITY, an institution of higher education for colored persons, organized by Clinton Bowen Fisk at Nashville, Tenn., in 1865. The institution is coeducational under the nominal jurisdiction of the Congregational Church, and maintains courses of study in medicine, theology, normal teaching, industrial arts, and advanced sciences. It has about 40 instructors, 550 students, a fine line of apparatus, and a library containing about 10,000 volumes. The annual income is about $7,500.

FITCH (fich), **John,** inventor, born in South Windsor, Conn., Jan. 21, 1743; suicided in 1798. He was the son of a farmer, secured a common school education, and went to sea at the age seventeen years. Later he became successively

a clockmaker, brass founder, and silversmith. Subsequently he served as deputy surveyor in Kentucky, and in 1786 founded a company for experimenting in steam navigation. He built a steamboat for conveying passengers on the Delaware, which developed into a successful enterprise, though the immediate undertaking proved a losing one and caused the dissolution of the company. In 1793 he proceeded to France for the purpose of introducing his invention, but met with no success. On returning to America he found squatters had settled on his property purchased in Virginia, while his invention brought him nothing but disappointment and poverty, which finally led to his sad death. The steamboat built by Robert Fulton was declared by a committee appointed in 1817 to be practically the same as the one John Fitch patented in 1791. It is certain that the result of his labor and ingenuity has been of lasting benefit to commerce and industrial enterprises.

FITCH, William Clyde, author and playwright, born in New York City, May 2, 1865. He graduated at Amherst College in 1886 and gave his attention to literature. His first story, "The Knighting of the Twins," was published while he attended college, and in 1890 his "Beau Brummel" was brought out at the Madison Square Theater by Richard Mansfield. He not only wrote many dramas, but adapted a number of plays from the German and French. Among his productions are "Her Great Match," "Nathan Hale," "The Masked Ball," "The Moth and the Flame," "The Cowboy and the Lady," "The Last of the Dandies," "Her Own Way," "The Woman in the Case," "The Way of the World," and "Captain Jinks of the Horse Marines." He died Sept. 4, 1909.

FITCHBURG, a city and one of the county seats of Worcester County, Massachusetts, on the Nookagee River, fifty miles northwest of Boston. It is on the Boston and Maine and the New York, New Haven and Hartford railroads. The public buildings include numerous churches, several high schools, a public library and art gallery, and a public hospital. Educational advancement is facilitated by a number of scientific societies. It is the seat of the Fitchburg State Normal School. Among the manufacturing establishments are iron foundries, machine shops, cotton, woolen, and flour mills, paper mills, shoe and shirt factories, and wood-turning establishments. The streets are finely paved, well lighted, and connected with suburban districts by electric car lines. It has a growing trade in merchandising and farm produce. Fitchburg was settled in 1719, was a part of Lunenburg until 1764, and was incorporated as a city in 1872. Population, 1905, 33,017; in 1910, 37,826.

FITCHETT, William Henry, journalist and author, born in Lincolnshire, England, in 1836. He was educated at the Melbourne University and entered the ministry. His able pulpit oratory and devoted Christian life caused his rapid promotion to positions of responsibility, and he was for some time president of the general conference of the Methodist Church in Australia. He published several magazines and was for a time editor of a daily newspaper in Melbourne, where he was president a number of years of the Methodist Ladies' College. His publications include "Fights for the Flag," "Deeds That Won the Empire," "Nelson and His Captains," "Life of Wesley," and "Unrealized Logic of Religions."

FITZGERALD, county seat of Ben Hill County, Georgia, on the Seaboard Air Line and other railroads. The surrounding country is agricultural. It has railroad shops, foundries, and a brisk trade. The features include the high school, courthouse, and city hall. It was incorporated in 1897. Population, 1910, 5,795.

FITZGERALD (fĭts-gĕr'ạld), **Edward,** poet, born near Woodbridge, England, Mar. 31, 1809; died June 14, 1883. His wide reading caused him to be attracted to Spanish and Persian literature. This bore fruit in his translations of "Six Dramas of Calderon." In 1859 he published his translation of "Rubáiyát," written by Omar Khayyám. The last mentioned is his greatest work and went through many editions. It is a free translation from the Persian, but gives the essence of the poem in a beautiful style of English. Fitzgerald was throughout his life a friend of Tennyson.

FIUME (fē-o͞o'mȧ), a seaport city of Hungary, on the Adriatic Sea, at the mouth of the Fiumara River. It has a fine harbor on the Gulf of Quarnero and has convenient railroad facilities. The manufactures include paper, tobacco, machinery, soap and clothing. Among the principal buildings are a municipal theater, a naval academy, the town hall, and the Church of Saint Vitus. It has a large interior and foreign trade. Fiume was a town of the Byzantine Empire. It became a possession of Austria in 1471, and since 1779 has been an imperial city of Hungary. Population, 1915, 39,603.

FIVE FORKS, the site of a battle fought in Dinwiddie County, Virginia, April 1, 1865. It was Grant's intention to cut General Lee off from Petersburg, and he accordingly dispatched Sheridan with cavalry and Warren with infantry to the extreme left, where Lee had stationed Pickett. Sheridan attacked the intrenchments at Five Forks held by Pickett's corps, but was driven back. On the next day he was reinforced by Warren's corps and carried the fortifications, taking 5,000 prisoners. The Union loss was 1,000 men. As a result Petersburg evacuated on April 2, and Richmond fell soon after.

FIVE NATIONS. See **Iroquois.**

FIXED STARS. See **Stars.**

FLAG, a banner used as a mark of distinction by a company, party, sovereign, or nation. It consists of a piece of cloth, usually

square, oblong, or triangular. The material is commonly of bunting, either plain or bearing a device, and is displayed as a standard, symbol, or signal by being attached by one edge to a staff, or to a halyard, by which it may be hoisted on a pole. The Egyptians originated the idea of standards early in their history, which is verified by inscriptions on very ancient sculptures and temples. That the Greeks and Romans followed by the adoption of standards and ensigns is clearly borne out by the *gonfalon,* which was borne in the Roman army near the commander in chief during an engagement. In the Middle Ages the *pennon* was used by a knight, while the *standard* served the purpose of distinguished persons. The cross appeared in the banners of the Crusaders during their historic upheavals in mediaeval European history.

The flag of Denmark is the oldest among European standards. It is red with a white cross and dates from the 13th century. The union of the three crosses of Saint George, Saint Andrew, and Saint Patrick first designated the union of Scotland with the kingdom of Great Britain, and later it symbolized the union of this kingdom with Ireland. It is known as the *union jack,* which at present constitutes the naval flag. In the British flag is a quartered field, one quarter blue, one quarter yellow, and two quarters red, which bears the insignia of Ireland, Scotland, and England.

The imperial flag of the German Empire is yellow, containing in the center the imperial arms and a gold shield. It is divided into quarters by the iron cross, three black eagles and the crown appearing on each of them. The Turkish Empire has a red flag, with eight pointed stars and a crescent moon; the latter became historic in distinction from the cross of the Crusaders. Russia has a yellow flag, on which the Russian arms are conspicuously displayed, but its naval flag is white with diagonal bars of blue. All nations and many sovereigns, states, principalities, and provinces have flags appropriate to their purpose, usually bearing a more or less decorative field in commemoration of some historic event.

Flags are borne on the masts of ships to designate the country to which they belong and to indicate the rank of the commanding officer. The regiments of an army are distinguished from each other by the flags they bear. A yellow flag borne on a vessel denotes quarantine and a red flag, that powder has been taken on board. A white flag is by the consent of all nations a flag of truce, and a vessel bearing such a flag is met by a vessel or boat under charge of a commissioned officer bearing a white flag. When a flag is lowered or hoisted to half the height of the staff on land or to half the mast of a ship, it indicates mourning. A flag is lowered or is pulled down as a mark of respect for a superior officer. To indicate distress, it is reversed. Aside from their use as emblems and to designate certain officers, flags serve an important purpose in mercantile and national navies as signals by which to communicate. They are used extensively for weather, railway, survey, and other signals.

In America the Colonies used the British flag prior to the separation from England, though several others had been proposed early in the agitation for separation. The first was one bearing the inscription "Join, or die," and, when the purposes of resistance to the British began to assert themselves more forcibly, a flag bearing a rattlesnake was designed. It bore the motto "Don't tread on me." However, Canada continues to use the imperial flag of Great Britain, but it also has a banner of its own, the Federal flag of Canada. See **Canada.**

The present national flag of the United States, called the *stars and stripes,* originated June 14, 1777, when the Continental Congress resolved that "the flag of the United States be thirteen stripes, alternate red and white, and that the union be thirteen white stars on a blue field." Congress changed the flag to fifteen red and white stripes and fifteen stars in 1794, but in 1818 an act was passed by which the original thirteen stripes and fifteen stars were restored, as the addition of a new stripe for each additional State would make the flag unwieldy. At that time it was provided that the thirteen horizontal stripes, which represent the thirteen original states, should be continued, while a new star should be added to the number with the admission of a new State into the Union, the addition to take effect on the Fourth of July next succeeding the admission. The first flag under this law was hoisted over the Capitol of the United States in 1818. It remains unchanged, except as to the number of stars. The last addition of stars was made in 1912, when Arizona and New Mexico were admitted into the Union.

FLAGELLANTS (flăj'ĕl-lạnts), a class of Christians which originated about the year 900, who thought that flagellation is a reasonable penance. It was recommended by the abbot of Prüm, in Rhenish Prussia, about that time, but did not become popular until 1260, when it came into prominence in connection with the struggle between the Guelphs and the Ghibellines. The second outbreak occurred in 1349, when the black plague was raging in Europe, and a third movement took place in 1414, at which time many became dissatisfied with the rule of the popes. The Flagellants enrolled for a period of 34 days; that is, one day for each year Christ lived on earth. They were stripped to the waist and scourged themselves with knotted whips as they marched from place to place, carrying banners and singing songs of praise. When blood was drawn as the result of flagellation, it was thought to atone for their own and others' sins. Since they belonged to the party of the Guelphs, they were

permitted to continue their practices by the Pope, but in 1349 Clement VI. issued a bull against them. Gregory VI. designated them as heretics in 1372, because they were said to consider flagellation more important than the sacraments. This sect had adherents throughout Western Europe, extending from Italy to Denmark and England.

FLAGEOLET (flăj'ō-lĕt), a wind instrument with a mouthpiece like a common whistle. It resembles the flute and is usually made of boxwood or ivory. Most instruments of this class are provided with a large aperture near the mouthpiece and six or more finger holes. The range is two octaves and the tone resembles that of the piccolo, but is softer in quality. *Flageolet tones* is the name given to the harmonic notes of the violin, violoncello, and other stringed instruments, which notes are produced by lightly touching the strings with the finger, thus producing a node, the string vibrating on both sides of the finger. See **Harmonics.**

FLAG OFFICER, a term used to designate a naval officer of rank high enough to command a fleet, or a subdivision of a fleet. Such an officer carries at the masthead a flag instead of a pennant, and is the naval equivalent of the general officer in the military. The vessel of the flag officer is called the *flagship.*

FLAG OF TRUCE, a signal that one of two contending naval or military forces desires to suspend hostilities. The flag used for such a purpose is white, and indicates that the party displaying it wishes to communicate or surrender. Firing upon a flag of truce is a breach of the naval or military code, and such an offense subjects the guilty party to severe retaliation and punishment. A flag of truce is sent by the senior officer to one of like rank, but the party who is to receive it may refuse acceptance, and the party bearing it may be warned not to proceed farther by a shot fired across the bow. A failure to stop when thus warned renders the party liable to be fired upon. A flag of truce is not permitted to be used to obtain private information, but serves only as a signal that the party displaying it desires to communicate.

FLAGSTONE, or **Flag,** the name of any rock that splits into tubular masses or flags, suitable for curbing, sidewalks, or doorsteps. Flagstones may be obtained from a variety of rocks, such as sandstone, limestone, and brownstone. A class of sandstone of the Devonian age yields bluestone which is well adapted for paving purposes.

FLAMBOYANT (flăm-boi'ạnt), in architecture, a showy style of decoration used extensively in the 15th century. It originated in France and is a form of Gothic architecture. Its realistic and pictorial treatment of decorative sculpture corresponds to the Perpendicular style used in England about the same time. The windows and panels are distinguished by flamelike tracery. The masterpieces of this style include the choir of Saint Séverin in Paris and the façades of the cathedral in Rouen.

FLAME, Temperature of, the condition, with respect to heat, of a blaze rising from a burning body. A flame usually consists of several parts which differ from each other in temperature as well as in color and illuminating power. The flame of a lighting device, such as a lamp or a gas jet, consists of an inner dark cone and a brilliant white envelope. In the center there is no combustion, hence the dark part of the flame, and the heat and the illuminating power are greatest where the combustion is most complete. The temperature of flames is a subject to which Rossetti gave much thought in 1878. After conducting careful investigations with his calorimeter, he announced the following table of results:

Locatelli lamp	1,688° Fahr.
Stearin candle	1,724° Fahr.
Petroleum lamp, with chimney	1,886° Fahr.
Petroleum lamp, without chimney—	
Illuminating part	1,688° Fahr.
Sooty envelope	1,436° Fahr.
Alcohol lamp	2,147° Fahr.
Bunsen burner	2,480° Fahr.

The temperature of an electric arc, as determined by Violle, is about 6,332° Fahr.

FLAMINGO (flă-mĭn'gō), a genus of migratory birds which until recently were placed among the waders, but they are now generally classed among the swimmers. However, they very seldom use their webbed feet for swimming, the web formation being designed rather for support on the soft, muddy bottoms. The body is not large, but the long neck and legs permit them to stand from three and a half to four feet high. In many respects the bill resembles that of a duck, but it turns suddenly downward near the middle, the mandible being furnished with small toothlike edges, which serve to prevent the escape of crustaceans, mollusks, worms, fish, or seeds, the common food. Flamingoes are birds of powerful wings and fly either in single file or in wedge-shaped flocks like geese, a single bird leading the way for the flock. The prevailing color is pinkish or reddish. The nest is made of mud scraped into a mound with the feet and hollowed out on top, in which two or three white eggs are laid and hatched, the young reaching maturity in about a year. Flamingoes inhabit Eurasia, Africa, and America. When feeding, they keep their feet continually going to stir up the mud. Some of the older birds act as sentinels for security to the rest. See illustration on following page.

FLAMINIAN WAY (flă-mĭn'ĭ-ạn), the chief road leading from ancient Rome to the northern provinces, so named from Caius Flaminius the Elder. It was platted to Arminium by Flaminius in 220 B. C., at the time he was censor, and subsequently branches were

laid out to all the important towns in the northern part of Italy. The length of the main road was 222 miles, which distance included many large grades and substantial bridges, remains of which are still found at some places.

FLAMMARION (flă-mà-rē-ôn′), **Camille,** noted astronomer, born in Montigney-le-Roi, France, Feb. 15, 1842. In 1858 he entered the Paris observatory, and soon after became distinguished as a lecturer on astronomy. He was selected as editor of the *Cosmos* in 1862. After 1865 he devoted his time largely to the publication of books and as scientific editor of the *Siècle.* For the purpose of studying aërial phenomena, he made numerous balloon ascensions, and in 1892 published an elaborate treatise on the theory that communication between the earth and planets which are nearest us is not impossible. Among his works are



FLAMINGO.

"Studies and Lectures on Astronomy," "Marvels of the Heavens," "Stars and Curiosities of the Heavens," "God in Nature," "Plurality of the Inhabited Worlds," "Imaginary and Real Worlds," and "Travels in the Air."

FLANDERS (flăn′dẽrz), the former name of a region of Europe, extending along the German Ocean. It is now included in Belgium, Holland, and France, forming the provinces of East and West Flanders, in Belgium; the southern part of Zealand, in Holland; and all of Le Nord, in France. The original inhabitants were Belgic tribes, who were subdued by Caesar, and the region was added to Roman Gaul. Later it came into the possession of the Franks and was added to Neustria by the Treaty of Verdun. Philip the Bold erected the territory into a government district in the 9th century and assigned it to his son-in-law, Count Baldwin I. In 1016 the town of Valenciennes was added and Ghent and the Zealand Islands became a part of the district about the same time. Hainaut, Alost, and Tournai were added in the reign of Baldwin V., after whose death the region was divided and passed consecutively to various countries.

In the 12th century the manufactures and commerce of Flanders rose to vast importance, and in the former part of the 14th century the Flemings were able to contest successfully with France. The latter country resigned its claims to Flanders in 1526. Afterward it passed to the united houses of Austria and Spain, though Charles V. of Germany ultimately secured control of the larger portion. A part was united with the Netherlands by the Treaty of Westphalia, and other portions to France by the Treaty of the Pyrenees in 1659, the Treaty of Nimeguen in 1678, and the Treaty of Utrecht in 1713. The other portions then remaining independent now form the provinces of East and West Flanders in Belgium.

East Flanders has an area of 1,158 square miles and, in 1916, had a population of 1,052,970. The area of West Flanders is 1,249 square miles and the population, in 1916, was 812,962. Ghent is the capital of the former and Bruges of the latter. The soil is productive and carefully cultivated, while the manufactures of the various products, such as laces, linens, and damasks, excel in quality. Both provinces have extensive communication by canals, electric railways, and steam railroads.

FLANDRIN (flän-drăn′), **Jean Hippolyte,** painter, born in Lyons, France, May 23, 1809; died in Rome, March 21, 1864. He ranks as the most renowned French historical and religious painter of the last century, and decorated numerous churches in France in 1842-45. Among his most noted productions are "Saint Clair of Nantes," "Christ Going Up to Calvary," and "Christ Entering Jerusalem." The last mentioned is at the Parisian Church of Saint Germain.

FLANNEL (flăn′nĕl), a woolen fabric differing from broadcloth and cashmere in being woven of yarn which is twisted more loosely. It varies in degree of fineness, and is used very extensively for shirts and undergarments. By allowing the perspiration easy passage and not appearing cold to the body, if damp, it is cooler in summer and warmer in winter than other fabrics. A class of loosely woven fabrics made of cotton are known as *outing flannels.* They have a napped face and many of the designs are colored attractively. Another class, the *domett flannels,* are made with cotton warp and woolen filling.

FLATFISH, the common name of all fishes that swim on their side, such as the sole,

flounder, turbot, plaice, and halibut. The body is much compressed. The side which is turned toward the bottom is generally colorless. It is called the blind side, from the absence of an eye, since both eyes are on the upper side of the head. Some flatfishes have the right and others the left side turned toward the bottom.

FLATHEAD, the name applied to various Indian tribes, owing to their custom of flattening the skulls of infants by pressure. This practice was common to the fish-eating Chinook Indians on the Pacific coast; to the ancient natives of Peru, both previous and subsequent to occupation by the Incas; among the Caribs of Florida and Central America; and, it is thought, among the mound builders of the Mississippi valley. The civilized Selish Indians are improperly called Flatheads, as they do not flatten the skulls of their children. They originally inhabited the valley of the Saint Mary's River, but conveyed their lands to the United States, and were removed to Idaho in 1871, where they occupied the Jocko reservation. They always were peaceable and are now advanced in education and the industries.

FLAX, an annual plant with alternate linear-lanceolate leaves, many-flowered broad cymes, usually yellow, blue, or white, and crenulate petals. It embraces about a hundred species, which grow more or less widely distributed in all warm and temperate climates. A large yield is reported in the United States, where, in 1917, the product was 25,862,000 bushels. More than one-half of the crop was grown in North Dakota. The States which ranked next are Minnesota and South Dakota. Other regions which produce large quantities of flax are Manitoba, Saskatchewan, Argentina, Russia, India, and Austria. However, Argentina generally takes the first rank in the production of flaxseed, while Russia is the leading flax fiber producing country in the world. Flax is grown very extensively, on account of the commercial value of the seed as well as for its fiber. In most countries the virgin soil, when first broken, produces the best yield of flax. The ground is plowed in autumn or in the spring, depending upon the locality, and the seed is sown either in drills or broadcast, usually in April. When the crop is ripe, generally in August, it is cut with a harvester and is afterward thrashed with a machine to obtain the seed.

A large amount of labor is required to secure the fibers in the best condition. For this purpose the crop is usually pulled up by hand, roots and all, and the seeds are removed by a process called *rippling.* To obtain the *lint,* or flaxen fiber, from the *boon,* or core, of the stem, the bundles are steeped in water until the boon begins to rot, when it can be separated readily from the fiber by means of a *scutching blade* or a machine. It is next *hackled,* or combed, after which it is spun into threads and woven into cloth. Linseed oil is pressed from the seed, and the residue is a highly fattening food for hogs and cattle.



FLAX.
a, Flower; *b*, Seed Pod.

Flax was cultivated extensively in ancient times, both in Egypt and Asia, and linen is spoken of in the Book of Joshua. See **Linen. Linseed Oil.**

FLAXMAN (flăks'mạn), **John,** distinguished sculptor, born in York, England, July 6, 1755; died Dec. 9, 1826. He entered the Royal Academy as a student in 1770, where he later made models and designs for the potter, Josiah Wedgwood (1730-1795), and in the same year won a silver medal. He went to Rome in 1787, where he studied seven years and produced numerous designs to illustrate Dante, Homer, and Aeschylus. In 1794 he returned to London and three years later was elected an associate of the Royal Academy. In 1800 he became a royal academician. Among his numerous productions is a fine monument in Westminster Abbey built to Lord Mansfield. The Royal Academy appointed him professor of sculpture in 1810.

FLEA (flē), a wingless insect, belonging to the hopping Diptera. It has two lancetlike mandibles, a sucker, and a slender, bristle-like tongue, the whole incased between two three-jointed plates. The entire body is covered with a tough integument. It is very ac-

tive and can leap two hundred times its length in a single bound. The common flea thrives particularly in the nests of poultry and on the fowls themselves. Some species infest the furs of animals and often prey upon man. In favorable weather fleas hatch in five or six days, in about twelve days they inclose themselves in a cocoon, and after eleven days more come out perfect insects. They are



DOG FLEA. COMMON FLEA. *a*, proboscis.

most numerous in dry climates and in filthy and uncouth places.

FLEABANE (flē'bān), the name of several species of plants, widely distributed in all the continents. The common fleabane of England grows to a height of fifteen inches, has panicled flowers, and is used in treating diarrhoea and dysentery. A species native to California yields ingredients useful in manufacturing the Persian insect powder and is recommended for its medicinal properties. Horseweed, butterweed, and sweet scabious are names applied to species found in the Mississippi Valley, especially in the northeastern section.

FLEMING (flĕm'ĭng), **Sir Sanford,** surveyor, born at Kirkcaldy, Scotland, Jan. 7, 1827. He studied in his native country and came to Canada in 1845, where he took up the work of an engineer on the Northern Railway. Later he was sent as commissioner to the Red River of the North to ascertain the advisibility of connecting it with the eastern part of Canada, and in 1871 began the survey for the Canadian Pacific Railway. In 1880 he was made chancellor of Queen's University, founded the Canadian Institute, and in 1888 was president of the Royal Society of Canada. He published "A Cable Across the Pacific," "Uniform Standard Time," and "The Prime Meridian Question." He died July 22, 1915.

FLEMISH (flĕm'ĭsh), the language spoken in a number of Belgian provinces, portions of Holland and France, and several countries adjacent to these. It is a form of Low German, or *Platt-Deutsch,* and differs but slightly from the German in pronunciation and orthography. In East and West Flanders, Limburg, Antwerp, and Brabant it is the universal tongue and gives evidence of but little change in dialect since the 8th century. The language spoken is very similar to the form of speech used by the Council of Liptines in 742, while preparing a creed in which pagans renounced idolatry when they embraced the Christian faith.

The Flemish literature is comparatively modern, and before the 19th century it was identical with the Dutch. However, some of the early writers of the literature which belongs to the Netherlands may be said to have laid a distinct foundation for the Flemish of modern times. Jakob Van Maerlant is regarded the father of Flemish poetry. He wrote several romances in which he treats the "Holy Grail," while "Reynard the Fox" and the "Mirror of History" were produced in the same period. In 1618 a translation of the Bible was made into the Flemish. It contains such elegance of expression that it is regarded the standard authority in orthography and construction. French ascendency tended to limit the language and literature, but after the revolution of 1830 it began to revive and take on its present form. Among the noted leaders in the revival of Flemish may be named Blommaert, Conscience, Van Duyse, Snieders, DeVries, Willems, Van Rijswijk, David Bormans, Willem Bilderdijk (1756-1831), and Snellaert.

FLENSBURG (flĕns'bo͝org), a city of Germany, in the province of Schleswig-Holstein, about forty miles northwest of Kiel. It is located on the Flensburg Fiord of the Baltic Sea and has railroad and electric railway facilities. The chief buildings include a courthouse, a theater, a public library, and the Marienkirche. Among the manufactures are carpets, oil, machinery, clothing, and sailing vessels. It has a large trade in coffee, grain, and live stock. Flensburg was founded in the 12th century. Population, 1910, 60,931.

FLEUR-DE-LIS (flēr-dẹ-lē'). See **Iris.**

FLEURY (flē-rē'), **André Hercule de,** cardinal, born at Lodève, France, June 22, 1653; died Jan. 29, 1743. He studied at Paris, entered the church, and in 1698 was made Bishop of Fréjus. In 1715 he became tutor to the young Louis XV., who was then five years of age, and when the latter ascended the throne Fleury was made a member of the council of state. He was raised to the dignity of cardinal in 1726, when he virtually became prime minister. He favored peace, reduced the expenses of the government and promoted a policy of internal improvement. The Bibliothèque Nationale at Paris was completed during his administration.

FLICKER (flĭk'ẽr), the popular name for the golden-winged woodpecker, a beautiful bird common to the eastern part of Canada and the United States. It is about a foot in length, has an olive-brown color, with black and white markings, and the head and neck are ash-colored. It winters in the southern part of the United States, moving northward on the early approach of spring. The food consists of worms and insects, which it extracts from the trees, but it also feeds on ber-

ries and the tender parts of plants. A large number of species of the flicker have been listed, including about 35. The *red-shafted flicker* is common to the region west of the Rocky Mountains, from Mexico to Alaska. *Yellow-hammer, sap-sucker,* and *high-holder* are other names locally applied to birds of this class.

FLINT, a mineral regarded as a species of quartz, or as intermediate between quartz and opal, consisting almost entirely of silica. It has slight traces of oxide of iron, lime, and carbon, and contains some organic matter. Flint is usually gray, smoke-brown, or brownish-black, but is sometimes spotted or mottled. Dark-colored varieties are usually found imbedded in chalk and are abundant wherever chalk formations prevail. Flint, when struck with steel, produces a spark of fire, which property was formerly made use of in firearms and for starting fires. Knives, axes, arrowheads, and various sharp weapons and cutting instruments are among the most interesting relics of antiquity.

FLINT, a river of Georgia, rises in Clayton County, and flows by an irregular course to the southwest corner of the State, where it joins the Chattahoochee to form the Apalachicola River. The entire course of 300 miles is through a rich agricultural and mineral country. Light-draft steamers navigate it as far as Albany, a distance of about 140 miles from its mouth. Larger steamers reach Bainbridge, a distance of 50 miles.

FLINT, a city of Michigan, county seat of Genesee County, on the Flint River, about sixty miles northwest of Detroit. It is on the Père Marquette and the Grand Trunk railroads. Electric car lines, waterworks telephones, pavements, and electric lighting are among the municipal facilities. It has a fine courthouse, a public library, and a commodious high school building. It is the seat of Oak Grove Home, an institution for the feebleminded, and of the State institution for the deaf and dumb. The principal manufactures include automobiles, woolen goods, flour, machinery, cigars, vehicles, and utensils. The surrounding country produces large quantities of cereals and fruits. Flint was settled in 1820 and incorporated as a city in 1855. Population, 1904, 14,884; in 1910, 38,550.

FLINT, Austin, physician, born in North Hampton, Mass., March 28, 1836. His father, Austin Flint, Sr. (1812-1886), was a successful physician and gave the son the advantages of a thorough education. He studied medicine at Jefferson Medical College, Philadelphia, and began a successful practice in Buffalo in 1857. In the meantime he was professor of physiology and anatomy in the University of Buffalo. In 1859 he located in New York City, the following year was chosen professor of physiology in the New Orleans Medical College, and subsequently studied in Europe. He was professor of anatomy and physiology in Bellevue Hospital Medical College from 1861 until that institution was affiliated with the New York University, in 1898, and that year became professor of physiology in Cornell University Medical College. His experimental investigations resulted in numerous discoveries, among them several relating to the function of the liver and the constituents of the bile. He contributed to medical literature and was long an influential member of many medical and scientific societies. Among his publications are "Effects of Severe and Prolonged Muscular Exercises," "Physiology of Man," "Physiology of the Nerves," "Treatment of Diabetes Mellitus," "Manual of Chemical Examination of the Urine in Disease," and "Experiments Regarding a New Function of the Liver, Separating the Cholesterin of the Blood and Eliminating it as Stercorin."

FLINT GLASS. See **Glass.**

FLINT IMPLEMENTS, the utensils formerly used in performing manual labor and as instruments of war. Specimens are found frequently in the places which were occupied by settlements in prehistoric ages. While they occur in all regions where settlements were maintained in early times, they are met with most numerously in European countries, particularly in Denmark, the Netherlands, and other regions of the northern and western parts of Europe. These implements consist of chisels, knives, daggers, saws, scrapers, arrowheads, axes, and borers, and served a useful purpose, though modern savages do not employ such tools. The American Indians made arrowheads and other instruments of flint, many specimens occurring in different sections of America, but they are more abundant in the Mississippi valley than elsewhere.

FLINTLOCK, a small gun originated by the Spaniards in the 17th century. It has a small piece of flint in the jaw of the hammer, which, when released, strikes a piece of steel, and the sparks ignite and explode the charge. William III. introduced flintlock muskets into England, where various forms of this class of firearms continued in use until about 1840. Arms of this kind formerly were used both in war and in sporting, but they have been superseded by modern weapons, such as breech-loading guns and rifles.

FLOATING ISLANDS, the formations caused in lakes and other inland waters by the aggregation of driftwood carried down by rivers, and by deposits of soil and vegetable matter, or by detachments of elevations adjacent to the banks of rivers or on shores of lakes. These islands occur more numerously

in tropical countries and receive their early consistency by interlacing roots of plants, and later by the growth of shrubs and even trees. Some of the islands are large enough to furnish pasturage and are met with from fifty to a hundred miles from the mouths of the large rivers of Asia, Africa, and America.

FLODDEN (flŏd'dĕn), **Battle of,** a severe military contest that occurred on Flodden Hill, Scotland, Sept. 9, 1513, between the English army commanded by the Earl of Surrey and the forces of James IV. of Scotland, in which the latter were defeated. The English army consisted of 32,000 men and the Scottish of 30,000. Both sides lost heavily. The English army lost 4,000, while the loss of the Scots was much heavier and included several earls and other officers of high rank. A description of the battle is given in Sir Walter Scott's "Marmion."

FLOOD PLAIN, a level tract of land on the border of a river, formed by sand and silt deposited during overflows. In many places the surface is highest near the margin of the river bank, where the greater amount of silt is deposited during an overflow, and some distance back are marshes and swamps, which are sometimes fed by springs or remain wet for want of sufficient drainage. The flood plains in the lower course of the Mississippi are very fertile. Formerly they were covered by meadows or swampy forests, but now they yield large quantities of agricultural products. Other tracts of this kind are located on the middle course of the Rhine and Danube and on the lower course of the Nile, Po, and Ganges. See **Delta.**

FLORA (flō'rȧ), the goddess of flowers, who was held in the highest esteem by the Romans. Her festival, the Floralia, was celebrated from April 28 to the first of May. The festival was one of universal merriment, in which houses, streets, and vehicles were profusely decorated with flowers. Two temples were built at Rome to this deity. She typified the season of spring, and was the reputed guardian and protectress of every blossom.

FLORENCE (flŏr'ĕns), county seat of Lauderdale County, Alabama, on the Tennessee River, 126 miles southwest of Nashville, Tenn. It is on the Southern and the Louisville and Nashville railroads, at the foot of the Muscle Shoals Canal, and is surrounded by a fertile agricultural and fruit-growing country. The noteworthy buildings include the county courthouse, the public high school, a State normal school, an academy, the Synodical Female College, and the Southern University for Women. Wildwood Park is a fine public resort. Among the manufactured products are cotton goods, cigars, machinery, vehicles, and building material. Near the city is one of the largest Indian mounds in the State. Coal deposits abound in the vicinity. Florence was settled in 1819 and incorporated in 1889. Population, 1900, 6,478; in 1910, 6,689.

FLORENCE, county seat of Florence County, South Carolina, 82 miles northeast of Columbia, on the Atlantic Coast Line and other railways. It has a large trade in cotton, tobacco, and merchandise. The features include the courthouse, high school, Y. M. C. A., city hall, and federal building. It has manufactures of tobacco, and cotton products. Pop., 1910, 7,057.

FLORENCE, a city of Italy, capital of a province of the same name, on the Armo River, about 140 miles northwest of Rome. It takes high rank in the manufacture of woolen and silk goods, porcelain, mosaic, hats, musical instruments, toys, and objects in the fine arts.

The public buildings include several beautiful palaces and impressive structures, and many piazzas or squares give the city a reputation for elegance and convenience. Among the principal buildings is the cathedral founded in 1298, and dedicated with much display and impressive ceremonies in 1887. Michael Angelo found the dome of this historic structure a convenient model for Saint Peter's. In the cathedral are numerous sculptures by master artists, among them Michael Angelo. Other churches contain almost an equal wealth of master productions in sculpture and painting. The celebrated buildings include the Uffizi, Vecchio, Signoria, Pitti, Strozzi, Il Bargello, and Riccardi palaces. The cathedral of Santa Maria del Fiore is the most remarkable building in the city. Many eminent Tuscans were buried in the church of Santa Croce, which has many fine decorations and celebrated tombs, among them those of Galileo, Michael Angelo, Alfieri, and Machiavelli. Dante's monument by Piazzi is situated in the Piazzi Santa Croce. A national library of more than 200,000 volumes and 12,000 manuscripts is located in the Pitti Palace, which also contains the celebrated Florentine gallery of art. Florence has numerous literary and educational establishments, a public school system, and institutions devoted to the arts, sciences, and higher educational interests. The Florence school of art is the most important in Italy.

Florence was founded by the Romans in the 1st century B. C., and probably named from Fiesole, a beautiful mountain near its site. It came under the dominion of Pope Gregory VII. in the 11th century, and by the middle of the 13th century it rose to commercial importance, ranking for many years as one of the first cities of Italy. An independent republic was established at Florence in 1283, and about fifteen years later great strife arose between rival parties under the names of Blacks (Ghibellines) and Whites (Guelphs), which resulted in the

defeat of the latter and the banishment of the leading members, among them the poet Dante. The republic fell in the 16th century and it was placed under Charles V. of Germany, who became known as the Duke of Florence, and was a member of the Medici. This dynasty ruled until 1737, when it was succeeded by Francis of Lorraine, who afterward became Emperor of Germany. The history of Florence is merged into that of Tuscany from that time until it became united with the kingdom of Italy. From 1864 to 1871 it was the provisional capital of the kingdom, whence dates its recent prosperity. Among the great men produced by Florence are Amerigo Vespucci, Galileo, Dante, Boccaccio, Michael Angelo, Vinci, Cellini, Andrea del Sarto, Medici, Machiavelli, and Petrarch. Population, 1916, 242,308.

FLORICULTURE (flō'rĭ-kŭl-tûr), the cultivation of flowers or ornamental plants. While this branch of the industries has been carried on in Eurasia from remote ages, it is of comparatively recent date in America, and has been pursued as a business only about a century. In 1890 the government census detailed the first general information in regard to floriculture in the United States, but much of material value was added by the census investigations of 1900. The number of floral establishments in 1908 was about 9,125, of which 580 were operated by women. Establishments of this kind are operated in all the states, over 1,000 acres of land are utilized for the purpose, and the value of the annual output is $35,250,000. Employment is given to about 22,500 men and women. The states of New Jersey, New York, and Pennsylvania take the leading rank in floriculture. Ontario and Quebec are the leading provinces in the floriculture of Canada. Among the products are cut flowers, rose bushes, plants, and shrubs. Roses, carnations, violets, chrysanthemums, and lilies are the leading flowers sold on the market, in the order named.

FLORIDA (flŏr'ĭ-dȧ), a southern State of the United States, popularly called the Everglade State. It is bounded on the north by Alabama and Georgia, east by the Atlantic Ocean, and south and west by the Gulf of Mexico, and west by Alabama. The larger part of the State is a peninsula, extending about 400 miles south from Georgia, the remainder being a narrow strip of land, the western point of which lies 350 miles west from the Atlantic Ocean. The western boundary is formed by the Perdido River, which enters the Gulf of Mexico at Perdido Point. About four-fifths of the State is contained in the peninsula. The area is 58,680 square miles, including a water surface of 4,440 square miles.

DESCRIPTION. The southern portion is generally low and marshy, while the northern part is more elevated and somewhat broken, though no part of it rises to a greater altitude than 306 feet above the sea. At Key Biscayne is the northern extremity of the Florida Keys, which stretch toward the southwest in a curved line about 200 miles. They consist of coral reefs and include a number of habitable islands, the surface of which is about ten feet above sea level. The Dry Tortugas, Key Large, and Key West are the larger of these islands. Among the larger coast indentations are Apalachee Bay, Tampa Bay, Biscayne Bay, Charlotte Harbor, Choctawhatchee Bay, and Pensacola Bay. The Atlantic coast line is about 470 miles and the coast of the Gulf of Mexico is 675 miles long.

Florida has about 1,200 lakes, most of which are located in the peninsula. Lake Okeechobee, with an area of 650 square miles, is the largest of the lakes. Others include lakes George, Apopka, Harris, and Kissimmee. The Saint Mary's River forms a part of the boundary between Florida and Georgia, and the Saint John's has its outlet into the Atlantic. Lake Okeechobee is drained by the Caloosahatchee, which flows into the Gulf of Mexico. The Peace flows into Charlotte Harbor; the Apalachicola and Suwanee, into the Gulf; the Choctawhatchee, into Choctawhatchee Bay; and the Escambia, into Pensacola Bay. The rivers have about 1,000 miles of navigable water.

CLIMATE. Its favorable situation between the temperate and tropical regions gives Florida an equable and agreeable climate. The freezing point is rarely reached, while the wholesome influences of the gulf and oceanic waters modify the climate agreeably during the warmer parts of the year. About 43° to 90° include the limits, though the temperature sometimes falls below 32° for brief periods in the northern part. The average annual temperature at Jacksonville is 69°; at Key West, 78°; and at Pensacola, 68°. In the swamp region the climate is unhealthful, but statistics accord the other parts of the State a very high position in the record of favorable climate, which fact is utilized by many invalids of the north, who seek a genial and healthful region during the winter season. Saint Augustine, Key West, and Jacksonville are among the popular winter resorts. Copious rains fall during the winter, while the summers are characterized by moderately dry, but agreeable and favorable, conditions. In some places the rainfall is 60 inches and at Jacksonville it is 54 inches.

MINERALS. Metallic mines are not worked in the State. Phosphate rock is the most important mineral product and is mined extensively for the manufacture of fertilizers. Deposits of this mineral occur most extensively between Tallahassee and Lake Okeechobee. Limited quantities of lignite coal and petroleum are ob-

tained. Deposits of fuller's earth are worked in the vicinity of Quincy. Agate, chalcedon, and carnelian are among the precious stones.

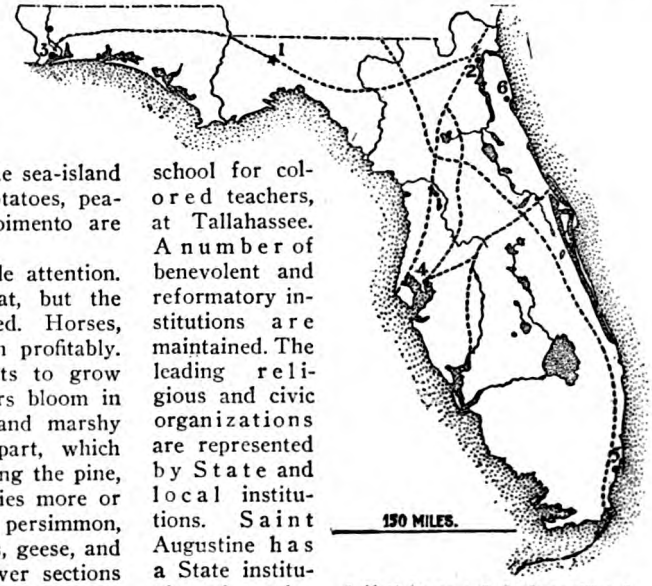
AGRICULTURE. Farming has increased constantly since the close of the Civil War and continues to rank as the leading industry. About one-third of the farmers are Negroes, who work tracts that average about half the size of those operated by the whites. A very limited proportion of the land in the Everglades has been brought into a state of cultivation, but large districts are subject to reclamation, and here the soil is exceeding fertile. The crops vary somewhat with location north and south. Orange culture has taken rank as an important industry and the State has about half the orange acreage of California. Corn is grown extensively in the northern part, and the last decade shows a considerable increase in the acreage of that cereal. Other crops include rice, oats, potatoes, tobacco, arrowroot, cassava, and many varieties of fruit. Several species of cotton thrive, including the sea-island cotton. Sugar cane, hay, sweet potatoes, peanuts, pepper, ginger, cloves, and pimento are other products of importance.

Stock raising receives considerable attention. Cattle are grown chiefly for meat, but the dairying interests are well established. Horses, mules, swine, and sheep are grown profitably. The favorable climate causes plants to grow with vigor and rapidity, and flowers bloom in all seasons of the year. Grassy and marshy plains characterize the northern part, which has an abundance of timber, including the pine, live oak, and palmetto. Other species more or less distributed are the magnolia, persimmon, and pitch pine. Wild turkeys, ducks, geese, and partridges are abundant in the newer sections of the State.

MANUFACTURING. The manufacture of cigars and tobacco is an important industry, and a part of the raw material is imported from Cuba. Tar and turpentine are made for exportation. The fisheries yield a large output, especially of shad, mullet, and sponges, much of the product being prepared for the market. Fruit is canned to a considerable extent. Other manufactures include fertilizers, railway cars, and sailing vessels.

COMMERCE AND TRANSPORTATION. The State has a large domestic and foreign trade, which centers chiefly at Tampa, Pensacola, Jacksonville, and Key West. Phosphate, cigars, fruit, vegetables, turpentine, fish, and forest products are among the chief articles of commerce. Tampa and Key West are especially noted for their large trade in cigars, while Carrabelle is important as a market for turpentine and Punta Gorda for fish and vegetables. Transportation is facilitated by 4,500 miles of railway, including the important line recently built to Key West. Many of the streams are navigable, which, together with navigation on the Atlantic and the Gulf, afford first-class facilities.

EDUCATION. Educationally, Florida is making material progress, its educational institutions being well established and liberally patronized. The common schools, high schools, and State institutions maintain well-articulated courses of study. A college of agriculture is located at Lake City. The East Florida Seminary and Military Institute is at Gainesville; the South Florida Military and Educational Institute, at Bartow; the West Florida Seminary, at Tallahassee; a State normal school for whites, at De Funiak; and a State normal school for colored teachers, at Tallahassee. A number of benevolent and reformatory institutions are maintained. The leading religious and civic organizations are represented by State and local institutions. Saint Augustine has a State institution for the blind and dumb and the State reformatory is at Marianna. School attendance has been increased materially by a process of transportation of the pupils, but the number of schools decreased somewhat.



1, Tallahassee; 2, Jacksonville; 3, Pensacola; 4, Tampa; 5, Miami; 6, Saint Augustine. Chief railroads are shown by dotted lines.

GOVERNMENT. The present constitution was ratified in 1886. It vests the chief executive power in the Governor, who is elected for four years and is not eligible to succeed himself. Other State officials, including the secretary, treasurer, attorney-general, comptroller, commissioner of agriculture, and superintendent of schools, are likewise elected for four years. The senate consists of 32 members elected for four years, and the general assembly has 68 members elected for two years. Legislative sessions are held biennially and are limited to sixty days. A chief justice and two associates, elected for six years, comprise the supreme

court, which is the tribunal of highest judicial power. The State is divided into circuits for judicial purposes, each having circuit judges. The towns, cities, and counties elect their respective officers, most of whom serve for terms of four years.

INHABITANTS. About eighty per cent. of the people reside in the country and in small towns. Fully one-half belong to the Methodist church. The remainder are divided among the Baptists, Presbyterians, Protestant Episcopal, Catholic, and other denominations. Tallahassee, in the northern part of the State, is the capital. Other cities include Jacksonville, Key West, Saint Augustine, Tampa, and Pensacola. The State has had a steady growth since the Civil War, both in wealth and in the number of inhabitants. The total population, in 1900, was 528,542; in 1910, 751,139.

HISTORY. The history of Florida begins with its discovery by Ponce de Leon in 1512, while he was in search of a mythical fountain whose waters would confer perpetual youth. It was discovered on Easter Sunday, the *Pascua Florida* of the Spaniards, hence the name Florida. De Soto explored it in 1539. In 1560 the French Calvinists founded a settlement, but they were shortly after massacred by the Spaniards. The region remained in possession of Spain until 1763, when it was ceded to England in exchange for Cuba, though the Spaniards regained the country in 1781. The United States purchased Florida in 1819, but the treaty was not finally ratified until 1821, when it was organized as a Territory, and it was admitted as a State in 1845. This treaty relinquished all Spanish authority over the region west of the Rocky Mountains, claimed as belonging to the Louisiana Purchase, but not previously acknowledged by Spain. Many of the settlements were disturbed by the Seminole Indian wars in 1835-42, though these Indians were removed to Indian Territory, now Oklahoma, shortly after. In 1861 Florida seceded from the Union, but was readmitted under the reconstruction policy of President Johnson. The State played an important part in the national election of 1876, when the contest for President was decided by the Electoral Commission (q. v.).

FLORIDA, Bay of, the name of the narrow channel between Florida and Cuba, lying west of the Bahama Islands. It is separated from Florida Bay by the Florida Keys, and is traversed by the Gulf Stream. It is about 60 miles long at the northern extremity and 130 miles at the southern, and has a length of 225 miles.

FLORIDA KEYS, a group or chain of islands at the southern extremity of Florida, belonging for the purpose of government to Monroe County. It stretches in a curved line fully 200 miles from Biscayne Bay toward the southwest into the Gulf of Mexico. The group includes thousands of islands, some of coral formation, and many are low, marshy, and uninhabitable. Key Largo is the largest, but Key West is the most important. The latter contains the city of Key West and a naval station.



FLORIDA KEYS, BAY OF FLORIDA, AND KEY WEST RAILROAD.

A railroad extends from the mainland across the principal chain of islets, connecting them by massive iron and concrete bridges.

FLORIN (flŏr'ĭn), a coin so named from Florence, Italy, where it was first issued in 1254. Coins of the same name and of different values have been issued in many countries. The *gulden*, originally issued in Germany, was until a comparatively recent time the monetary unit of Austria, and the *guilder* is still used in the Netherlands. A silver piece with a value of two shillings is in circulation in Great Britain, and bears the official name of *florin*, but the gold florin of England has not been issued since the Middle Ages. The English florin is worth here about 50 cents; the Dutch guilder, about 40 cents; and the German gulden about 35 cents.

FLOTOW (flō'tō), **Friedrich, Freiherr von,** musical composer, born at Teutendorf, in Mecklenburg, Germany, April 27, 1812; died in Weisbaden, Jan. 24, 1883. After attending the schools of his native town, he studied under Reicha in Paris, and attained a reputation by his early operas. He was appointed superintendent of the theater in Schwerin in 1856, where he attained much success, producing numerous operas and symphonies. In 1863 he resigned, after which he resided chiefly in Paris. Among his most celebrated compositions are "Alessandro Stradella," "Martha," and "Indra."

FLOTSAM (flŏt'sam), the name applied in the English law upon the goods that float upon the surface of the water after a shipwreck, or

such as are thrown overboard to lighten the cargo. They belong to the crown if they are not claimed by their owner after recovery. Goods that are cast from a ship in peril are sometimes called *jetsam,* and those that are tied to wood or a cask before being cast out are designated as *ligan.* These words are now seldom used, but the term *jettison* is employed in connection with insurance.

FLOUNDER (floun'dĕr), a genus of fishes of the flatfish family, found along the shores of almost all countries. The body is often a foot or more in length, extremely flattened at the sides, and about one-third as wide as it is long. Like other flatfish, they usually swim on the left side, but reversed specimens are common. About 150 species of the flounder have been studied, most of which occur in salt water, but several of the species thrive in lakes and other bodies of fresh water. The color varies according to the ground where the fish live. Flounders are excellent and favorite food fish.

FLOUR, the ground and bolted portions of cereals, though specifically applied only to the products made of wheat. When applied to the finely ground substance of any other cereal it is usually specified, as rye flour, buckwheat flour. Among the principal food products flour is of vastly greater importance than any other, and, as an edible substance, enters into manifold convenient forms, such as bread, biscuit, cake, pudding, and crackers. Rice being the favorite food of the Mongolians of Asia and entering quite largely the edible substances of other people, it is the only cereal that rivals flour as food for man. The cultivation of cereal plants is as old as the history of man, which likewise is true of the use of their seed for food.

Various relics of remote antiquity indicate that crude devices were employed in the manufacture of flour from wheat and rye. The process consisted of crushing the grains in a cavity cut in stone by means of a conical piece of porphyry, crystal, or marble. In the later period of ancient Egypt and the early times of Rome, the pestle and mortar served for crushing grain, which were soon displaced by the ox mill and later by the water mill. In early water mills the process of grinding was effected by an upper and lower millstone. The latter had a slightly convex surface, over which the concave surface of the former fitted. The grain passing between the two in a slow but constant stream was ground to a mixed mass of flour, middlings, and bran, each of which was afterward separated from the others. Modified forms of this class of mills are still used in newly settled countries and among people who do not manufacture vast quantities of flour.

In modern flour milling it is customary to convey the wheat from railway cars, in which it is shipped from the agricultural districts, into bins. From the bins it is carried by means of elevators into storage rooms at the top of the mill building, where it is kept until needed for grinding. The machinery for manufacturing flour is located usually on the first floor, and as the grain is let down all foreign matters are separated from it. In the cleaning process all the oats, chaff, dirt, dust, cockle, and other impurities are taken out by means of blasts of air, sieves, and powerful magnets, the latter removing all particles of iron that may have mixed with the grain in threshing and in transportation. After this process of cleaning, it passes consecutively between rollers or cylinders having spiral corrugations that operate to crush it. The first of these are coarse and serve to break the wheat into particles, but they become finer and are set more closely together until the last of the series effects a very high degree of crushing.

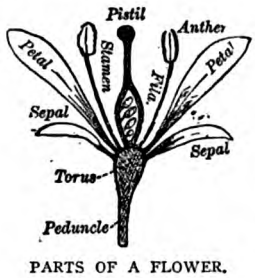
After the wheat is crushed sufficiently, the product is carried to complicated machinery in which the *flour, middlings,* and *bran* are separated. This machinery has been perfected to such a high state that remaining impurities can be removed and all portions of the wheat are utilized to the best purpose. Formerly the mills were somewhat unpleasant because of the flying particles of flour. However, this has been overcome by a dust collecting machine, which creates a vacuum through the agency of a fan, causing the suspended particles to be drawn by currents of air into a chamber, from which they are removed at certain intervals. Roller mills are now employed in manufacturing flour both from spring and winter wheat, and are propelled successfully by water, steam, or electric power, though the first named is far the most inexpensive.

About 18,500 flouring mills are operated in the United States. Those at Saint Anthony Falls, Minneapolis, are propelled by water power and are the largest in the world. Pennsylvania has the largest number of mills, though most of them are small. Canada holds the second rank in the list of North American countries as a producer of flour. The vast wheat fields of the central-western section have made this possible. Winnipeg is one of the great flour-producing cities of the world. Other centers are at Toronto, Ottawa, and Vancouver. A national association of millers is supported in the United States, which has numerous branches in the several states where milling is an important industry. With it are associated a number of mutual insurance companies. About 16,500,000 barrels of flour are exported from the United States annually, while the domestic market requires 75,500,000 barrels.

FLOURENS (flōō-räN'), **Léopold Emile,** public man, born in Paris, France, in 1841. He secured a general education and turned his attention to politics. In 1863-68 he was auditor of the imperial council, and in 1879 became superintendent of a department in the ministry of education, in which capacity he sided with

the policy of Justin Combes. He was made president of the department of legislation, justice, and foreign affairs in 1885, and the following year became minister of foreign affairs, which position he held until 1888. He is the author of a number of works relating to jurisprudence and contributed to current literature.

FLOWER (flou'ẽr), the bloom or blossom of a plant, the terminal bud inclosing the organs of reproduction. The *stamens* and *pistils* are the essential parts of a flower. These are usually surrounded by floral envelopes, the *calyx* and *corolla,* but in the lily, crocus, and other endogenous plants they are not distinguishable. The leaves of the calyx are called *sepals,* and those of the corolla are known as *petals.* In flowers the stamens, or male organs of reproduction, are composed of the *filament, anther,* and *pollen.* The pistils, or female organs, consist of the *style, stigma, ovary,* and *ovules.* Where both stamens and pistils appear in the same flower, it is said to be hermaphrodite or perfect, but, if only the stamens appear, it is unisexual or imperfect. A flower which has only the pistils is said to be barren or sterile. Sometimes both calyx and corolla are wanting, when it is said to be naked. If both the stamens and pistils are wanting, the flower is termed neuter or empty. An assemblage of flowers on a plant is called an *inflorescence.* If there is no flower stalk, or peduncle, of which the torus is the upper part, the flower is said to be sessile.



PARTS OF A FLOWER.

The primary object of the flower is to furnish the necessary elements of reproduction. To accomplish this essential function, the pollen must be transported from the stamen to the pistil, which may be done through the agency of insects, but in most cases is effected by the pollen falling or being blown through the air. The best results come from fertilization by pollen from a different flower of the same plant or from a different plant. Much has been done in floriculture to develop both a high degree of fertilization and showy blossoms.

FLOWER, Roswell Pettibone, statesman, born in Theresa, N. Y., Aug. 7, 1835; died May 12, 1899. His father died when Roswell was eight years old, which necessitated working as a farm hand and as clerk to aid in the support of his father's family. Later he took a course in the Theresa high school, became a school teacher, and later engaged in the trade of a jeweler. Subsequently, in 1869, he became a banker in New York City. In 1881 he was elected as a Democrat to Congress, was reëlected in 1888 and 1890, and in 1891 became Governor of New York. His administration as Governor was eminently successful, among the events of note being his prompt and able disposition of matters relating to the cholera scare. In 1895 he retired from politics to manage his vast business interests, and expended large sums of money for charitable purposes. Among his donations are those devoted to building the Flower Hospital in New York and several large churches. In 1896 he opposed bimetallism and aided in the defeat of his party in New York.

FLOWERS, Adoption of, the selection of flowers as symbols by certain states and nations. Floral symbols came into use in very early times and mention is made of them in the early history of China and in biblical literature. The lotus, or sacred lily, was consecrated to the gods in Egypt, and afterward became the national emblem. Many nations of antiquity used a code of floral symbols in decorating the surfaces of monuments and in making inscriptions in temples, but these are not understood. Throughout history is a line of records that conveys information in regard to the extensive use of flowers in national ceremonies, but the selection of particular flowers came about rather as a matter of sentiment than by legal or national adoption. Edward I. of England wore the red rose, from which circumstance the rose became the national emblem of that country. However, the British coat of arms contains the English rose, the Irish shamrock and the Scotch thistle. In Canada the maple leaf has been the national emblem since 1834. It is the leaf of the sugar maple of the forest, which is renowned for the brilliant colors of its foliage in autumn. The following is a partial list of the national emblems:

Canada	Maple Leaf
England	Rose
Egypt	Lotus
France	Fleur-de-lis, or Iris
Germany	Cornflower
Greece	Blue Violet
India	Lotus
Ireland	Shamrock
Italy	White Lily
Japan	Chrysanthemum
Mexico	Prickly Pear
Persia	Rose
Scotland	Thistle
Spain	Scarlet Pomegranate
Switzerland	Rare Edelweiss
United States	Goldenrod

Many of the states of the United States adopted flowers by a vote of the public school children, and in others adoptions were made by acts of the legislatures, as follows:

Alabama	Goldenrod
Alaska	Forget-me-not
Arizona	Sequoia Cactus
Arkansas	Apple Blossom
California	Poppy
Colorado	Columbine



(Opp. 1020)

BEAUTIFUL FLOWERS.

Pansy.
Carnation.

Tulip.
Poppy.



Connecticut	Mountain Laurel
Delaware	Peach Blossom
Florida	Orange Blossom
Georgia	Cherokee Rose
Idaho	Syringa
Illinois	Violet
Indiana	Carnation
Iowa	Wild Rose
Kansas	Sunflower
Kentucky	Goldenrod
Louisiana	Magnolia
Maine	Pine Cone and Tassel
Maryland	Black-Eyed Susan
Michigan	Apple Blossom
Minnesota	Moccasin
Mississippi	Magnolia
Missouri	Goldenrod
Montana	Bitterroot
Nebraska	Goldenrod
Nevada	Sage-brush
New Jersey	Sugar Maple (Tree)
New Mexico	Cactus
New York	Rose
North Dakota	Golden Rod
Ohio	Scarlet Carnation
Oklahoma	Mistletoe
Oregon	Grape
Rhode Island	Violet
South Dakota	Anemone
Texas	Bluebonnet
Utah	Sego Lily
Vermont	Red Clover
Washington	Rhododendron
West Virginia	Rhododendron
Wisconsin	Violet
Wyoming	Gentian

FLOWERS, Artificial; the materials used in making artificial flowers include wax, shell, horn, whalebone, paper, rubber, ribbons, velvet, cambric, jaconet, calico, muslin, blown glass, crape, gauze, satin, bamboo, and feathers.

FLOWERS, Language of, the method of using flowers as types to express thoughts and feelings. The art of using flowers to convey messages originated in ancient times, when the custom was better understood and more generally practiced than at present. An extensive flower language was developed in the western part of Asia at a remote period, but the Greeks and Romans conveyed to us the most authentic record of its use and application. Though nations widely remote from each other cultivated the use of such a language, it is interesting to note that they agreed in applying the same sentiment to many of the flowers. For instance, the amaranth signifies immortality; the oak leaf, power; the moss rosebud, a confession of love; and the white rose, happy love. The following is a partial list of the more important flowers used in expressing sentiments:

Amaranth	Immortality
Anemone	Anticipation
Apple Blossom	Preference
Aspen Leaf	Fear
Brier	Insult
Buttercup	Riches
Camellia	Illness
Calla	Pride
Candytuft	Indifference
Cornflower	Heaven
Cowslip	Youthful Beauty
Cypress	Death
Daffodil	Unrequited Love
Daisy	Simplicity
Dandelion	Coquetry
Evergreen	Hope
Everlastings	Undying Affection
Fern	Forsaken
Five-leafed Clover	Bad Luck
Forget-Me-Not	True Love
Four-leafed Clover	Good Luck
Foxglove	Insincerity
Geranium	Deceit
Goldenrod	Encouragement
Heather	Loneliness
Heliotrope	Devotion
Hepatica	Anger
Honeysuckle	Fidelity
Hyacinth	Sorrow
Ivy	Trustfulness
Laurel	Fame
Lilac	Fastidiousness
Lily	Majesty, Purity
Lotus	Forgetfulness
Marigold	Contempt
Moss or a dry twig	Old Age
Myrtle	Wedded Bliss
Narcissus	Vanity
Oak Leaf	Power
Orange Blossom	Marriage
Oxalis	Pangs of Regret
Palm Leaf	Conquest
Pansy	Loving Thoughts
Poppy	A Tryst at Evening
Rosemary	Remembrance
Rue	Repentance
Scarlet Geranium	A Kiss
Snowdrop	A Friend in Need
Sting Nettle	Rudeness
Sweet William	Gallantry
Tuberose	Bereavement
Tulip	Boldness
Violet	Modesty
Yellow Rose	Jealousy

FLOYD, John Buchanan, statesman and soldier, born in Blackburg, Va., June 1, 1807; died Aug. 26, 1863. He attended the College of South Carolina, was admitted to the bar, and practiced his profession in Arkansas and Virginia. In 1847 he was elected to the Virginia Legislature, and became the Governor of that State in 1850. From 1857 to 1860 he was Secretary of War, but resigned in the latter year to join the Confederate States. The following year he became brigadier general in the Confederate army and commanded at Fort Donelson, where he was defeated, and soon after was relieved of his command.

FLÜGEL (flü'gĕl), **Otto,** philosopher, born at Lützen, Germany, in 1842. He studied at the University of Halle, near which city he served as pastor of an Evangelical church, and in 1894 founded the *Journal of Philosophy and Pedagogy*. As an editor and writer he was prolific and searching, and contributed much to educa-

tion and the upbuilding of intelligence. He supported the realistic philosophical theories of Herbart as opposed to the tenets of Kant. Among his writings are "Speculative Theories of the Present," "Materialism from the Standpoint of Nature Study," "Treatise Regarding the Soul-Life of Animals," and "Social Teachings of Jesus."

FLUIDS (flū'ĭds), the substances whose molecules change places freely by slight pressure. They include liquids and gases, as opposed to solids. Liquids possess no definite shape, but assume that of the vessel in which they are kept, except at the upper surface, which is level. Gas inclosed in a bottle presses upward against the cork as well as against the sides and base. From this fact liquids are said to be nonelastic fluids and gases are termed elastic fluids.

FLUKEWORM (flūk'wôrm), or **Fluke,** the name of several kinds of worms found in the liver and biliary ducts of sheep, in which it causes the disease commonly called *rot.* The eggs, which are laid in the liver, pass to the exterior by means of the gall and the intestines and hatch on the wet grass. After undergoing a complicated process of development, they crawl about on the grass and are eaten by the sheep, and inside of the stomach undergo another form of metamorphosis. Later they bore through the animal tissue and find lodgment in the liver, where they reach sexual maturity. Other species attack birds and fishes, and a kind common to Egypt infests different organs and tissues of man.

FLUORESCENCE (flū-ō-rĕs'ẹns), the property possessed by some transparent bodies which causes them to produce at their surface, or within their substance, light of a different color than that of the mass of the material. This may be demonstrated by exposing green crystals of fluor spar to light, when the reflections are blue. This is due to the property which the substance has of modifying the light striking upon it. Glass colored of a yellow tint with oxide of uranium, known as canary glass, produces fluorescence of a brilliant green tint.

FLUORINE (flū'ŏr-ĭn), a nonmetallic element separated from fluor spar or fluoride of calcium by the action of sulphuric acid. It is not found native and can be isolated only with great difficulty, since it combines very readily with different substances. The stems of grasses, mineral springs, sea water, and many animal substances contain fluorine. Compounds of fluorine are used in preserving food, in etching glass, and for antiseptic purposes. It has the property of corroding objects with which it comes in contact, hence must be preserved in lead or ceresin bottles.

FLUOROSCOPE (flū-ŏr'ō-skōp), an instrument employed to transfer X-rays into light. This light enables an observer to see through several inches of wood, observe the bones of the living body, or other objects of dense construction in bodies usually opaque. The fluoroscope was invented by Thomas A. Edison, who tried over 800 different salts in experimenting to perfect a suitable instrument. The most satisfactory fluoroscope consists of a rectangular box a foot long, tapering toward the farther end, at which a fluorescent screen is placed. The inside of the box is painted black. The screen is made of pasteboard, covered with white paper and then coated with collodion, on which fine crystals of calcium tungstate are sifted. In passing four amperes through a Crookes tube, and holding an object between it and the fluoroscope, the observer can see through the screen and the object, and thus study visually the phenomena discovered by Röentgen.

FLUOR SPAR (flū'ŏr spär), the fluoride of calcium, which occurs especially in deposits of cobalt, tin, silver, lead, and other beds of metals. It is usually blue, green, yellow, or pink, though it occurs also in colorless and transparent forms. Fluor spar occurs in Norway, England, and Germany. The annual American product is valued at about $115,000, and is obtained chiefly in Kentucky and Illinois. It is used as a flux in iron smelting, and in the manufacture of opalescent glass and hydrofluoric acid.

FLUTE (flūt), one of the oldest wind musical instruments. It has four joints, tapers toward one end, and contains a number of holes to be covered with the fingers or by keys. Some flutes have a mouthpiece, but others are played by placing the lower lip close against the hole of the outside and blowing the air so its passage is broken against the opposite edge of the hole, causing the air inside the hole to vibrate. Its soft, pleasant tone and wide range in compass make it an important instrument in orchestral music.

FLUX (flŭx), a substance used to promote the fusion of minerals, or to cause their decomposition. Many materials are employed for this purpose, depending upon the nature of the body to be treated and the chemical action desired. Limestone unites with the alumina and silica of iron ores, hence is the usual flux employed in the blast furnace. Borax forms fusible compounds with silica and other bases and is used very generally as a flux. Cyanide of potassium is employed both as a flux and a reducing agent and niter and litharge are good fluxes and oxidizing agents. Many substances, such as litharge, boracic acid, and red lead, are used as flux in making pottery.

FLY, an insect characterized by possessing but two wings, the posterior set being reduced to a pair of so-called balancing rods, or legs. The proboscis or underlip ends in two flaps, which are used for lapping. A long list of pests belongs to the order Diptera, or two-winged insects, such as gadflies, bat flies, blow-

flies, and the common house flies. About 40,000 species have been described, but these are thought to be only about one-eighth of the number which at present are represented by living species. To these may be added a long list of extinct and fossil flies. Not less than



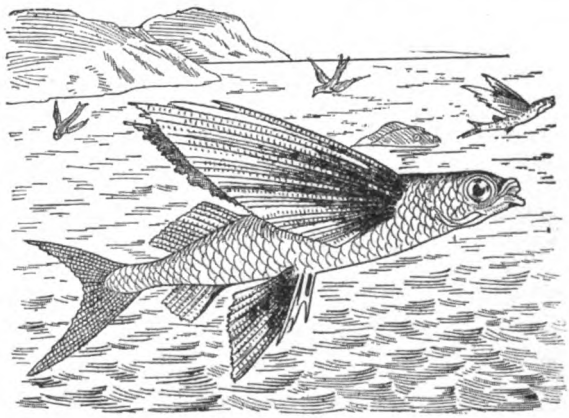
1, MUSCID; 2, SYRPHUS; 1*a*, FLY'S FOOT.

1,500 species have been described from the fossils found in the shale beds of Florissant, Colo., and many other sources are fully as prolific.

The eggs of a fly hatch into larvae in about a day. They then pass into a quiescent pupa stage for several days more, whence they issue as full-grown insects. In warm climates flies are seen the entire year, but where the winters are cold they disappear on the approach of heavy frosts. A few survive the winter in sheltered places. These, together with some of the eggs and pupae, preserve the species. Flies are enabled to walk on smooth surfaces and ceilings with their backs downward by a hairlike cushion which serves to hold them in place, partly by a glutinous fluid secretion and partly because of their ability to remove the air from below the feet by means of suckers through the hair, the pressure of the air on the outside serving to support the insect. The muscid, or house fly, and the syrphus, or drone fly, are well-known species of these insects.

FLYCATCHER (flī'kăch-ĕr), the common name of many birds native to America, so named from their ability to catch flies and other insects. They have the habit of waiting until the insect comes very near, when they dart suddenly to secure it, after which they return to the same place. Birds of this class are seldom seen on the ground or in the act of chasing insects in the air like swallows. The *Savannah flycatcher* is common to the southern part of the United States. About 350 species are native to North America, and they are widely distributed from Panama to the northern part of Canada, but are best represented where insects are most numerous. Only four species are native to Europe, including the *spotted flycatcher* seen both in Great Britain and on the continent. The kingbird (q. v.) belongs to the family of flycatchers.

FLYING FISH, a name applied to all fishes which have large pectoral fins and are able to sustain themselves in short seeming flights above the water. A large number of species belong to this class, about thirty, and two families, most of which are common to the warm zones. They swim in shoals near the surface and, leaving the water, often dart through the air for a distance of several hundred feet. Little, if any, force is acquired while the fish are in the air, but, instead, the strong tail seems to be the only source of motive power, the winglike pectoral fins serving rather as parachutes to support the body in the air. It does not seem true that these fishes leave the water merely to escape danger as has been asserted by some writers, but they do so as a means of exercising in the air, of which they appear to be fond. The *flying gurnard,* a spiny fish of the Gulf of Mexico and the Atlantic coast, emits a phosphorescent light in the night. Flying fish rarely rise more than four feet above the water, but when a school is met by a small boat they move in all directions and sometimes a few fall upon the



FLYING FISH.

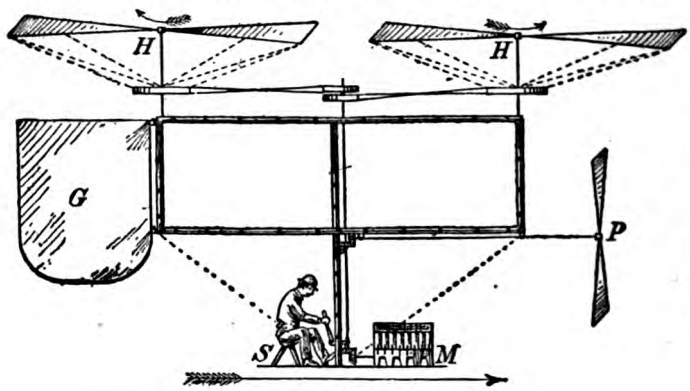
deck. They are about a foot long and are held in high esteem as food.

FLYING MACHINE, a mechanical structure designed to navigate the air. It differs from a balloon mainly in that a flying machine is heavier than the air, while a balloon is lighter. Efforts to navigate the air by means of mechanical apparatus have been made for about five centuries and, though some degree of success was made in the last century, the successful solution of the problem has been approached only within the last decade. *Aëronauts* constitute a class who think air navigation possible only by means of balloons, while *aviators* have been multiplying in numbers, believing it possible to perfect flying machines with which movement in the air will be as safe and rapid as upon the land or the water. They have studied the structure and flight of large birds and from them have drawn lessons so valuable that the perfection of a safety flying machine is fast nearing its culmination.

In the 17th century Bernier, of Sable, France,

constructed two pairs of wings, which he fastened to the shoulders and ankles with leather straps. By means of these mechanical devices he was able to guide himself in the air and fly for some distance, especially when starting by running from an elevation and thence moving over the valley beneath. In 1896 the secretary of the Smithsonian Institute, Prof. S. P. Langley, completed his *aërodrome,* a flying machine which he sent up with much success, and perfected it to such a state that it was possible to move, ascend, and return successfully. O. Chanute, of Chicago, in the same year carried on elaborate experiments with his *aëroplane,* which enabled him to fly and soar quite successfully.

The German aviator, Otto Lilienthal, up to 1901 attained the greatest success in flying. In construction his machine was very closely modeled after the characteristics of birds. The apparatus had outspreading wings, which were made in imitation of the spreading pinions of



SANTOS-DUMONT'S HÉLICOPTÈRE.

H, H, Lifting propellers; *P,* Driving propeller; *G,* Rudder; *M,* Motor; *S,* Aëronaut's seat.

a bird, and was constructed of light wooden frames covered with cotton drilling. In flying, the legs of the operator were free, thus enabling him to start by running or from elevations much like the larger birds. The construction was such that he was suspended safely within the lower part, leaving the body and limbs quite free to move, and in this way he was permitted, at least to some extent, to direct the course to be taken. On a number of occasions he soared to heights far above the starting point and moved over considerable distances. Dr. Danilewsky, of Charkov, Russia, completed and used a flying machine in 1898, which combined with aviation the principle of a balloon, and gave rise to the newer *dirigible* balloons. In the meantime the United States appropriated $25,000 for experiments relating to aërial navigation. The investigations were instrumental in obtaining a number of improvements, such as combining steam, electric, gas, and compressed-air motors with the machines to secure motive power. At the same time many screw and fan devices to guide and propel were invented. On July 2, 1900, Count Zeppelin, a German cavalry officer, made a successful flights with his dirigible balloon, which combines the principles of a balloon and a flying machine. Later he improved on this form of an airship so he was able to sail safely with his large war machines at the rate of forty to eighty miles per hour.

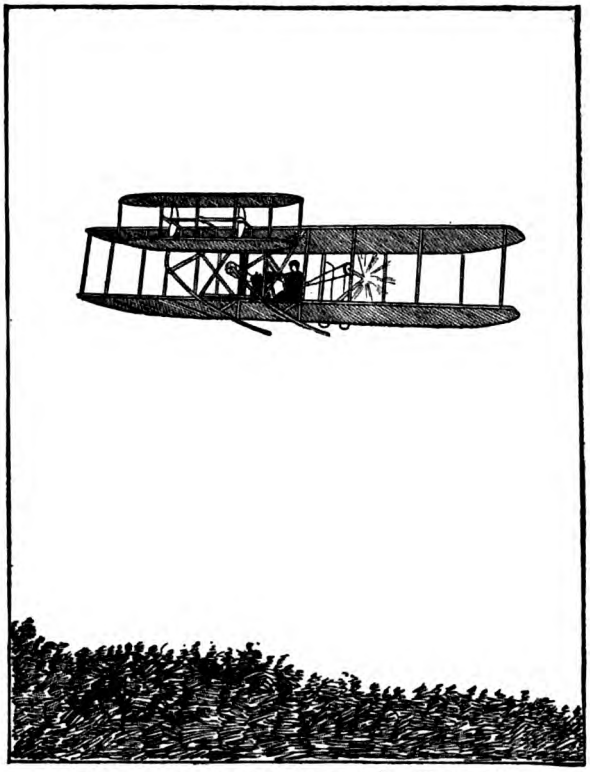
Henry Farman, the French aëronaut, won the Deutsch-Archdean prize of $10,000 with his flying machine in 1908. It sailed at a height of about fifty feet at the rate of 25 miles an hour and was under perfect control during the entire time. This machine, like the *hélicoptère* or screw flyer of Santos-Dumont, is heavier than air and is one of the earliest types of this class. Another machine of this pattern is the air ship of M. Le Baudy, which has a record of sixty miles in two hours and 46 minutes. At the head of the list of successful inventors stand Orville and Wilbur Wright, two American aëronauts, whose aëroplane, the *Bird of Prey,* demonstrated much capacity for flying in 1908 and since. Many notable discoveries in aviation were made from practical experience in the Great European War. These include the enlargement of carrying capacity, both for men and materials, such as bombs and rapid-firing machine guns, even at an altitude of more than 10,000 feet.

FLYING SQUIRREL, a species of the squirrel family, about five inches long, having a fold of skin extending along each side between the fore and hind legs. The tail is about four inches long and has two horizontal rows of hair, which aid to direct its motion and support the body in the air. It does not fly, but sails through the air as a parachute, getting its momentum by springing from a tree at a considerable height, descending obliquely until very near the ground, when it glides upward and usually alights at about one-third of the height from which it started. It has a brownish-gray color. The food consists chiefly of the young shoots of trees, nuts, insects, and small birds.

FOG, a thick mist at or near the earth's surface, resulting whenever the temperature of the air is reduced slightly below the dew point. The minute drops of water that form fog, though 800 times heavier than air, are prevented from settling rapidly by the resistance of the atmosphere. This is rendered possible by the minute size of the drops, which are much smaller than the relatively heavier dust particles common in the air and wafted

about by the wind. Fogs disappear on the approach of warm winds. Off the banks of Newfoundland the warm, moist air of the Gulf Stream is cooled by the cold air of the Labrador ocean current, hence frequent and almost constant fogs arise.

FOGAZZARO (fō-gȧ-tsä′rō), **Antonio,** novelist, born in Vicenza, Italy, in 1842; died Mar. 6, 1911. He attended the schools of his native city and had the advantage of a thorough training for a literary career. In 1874 he published his first poem that attracted attention, under the title of "Miranda," and two years later published "Valsolda," a collection of lyrics. Subsequently he turned his attention to novel writ-



ORVILLE AND WILBUR WRIGHT'S AËROPLANE.

ing, into which he was able to weave realistic imagination and invention, attaining thereby a high reputation among the writers of Italy. Under the title of "Fedele" he published his best story, which has been widely translated. Other writings include "Malombra," "Daniele Cortis," "Eva," and "Alla Vigilia."

FOG SIGNALS, the signs communicated in foggy weather by sounding a whistle, ringing a bell, firing guns, or by other methods in order to avoid collisions and prevent vessels from running upon places of danger. Light and other signals cannot be seen, so notice can be given only by sound. The steam siren foghorn invented by Cagnard de la Tour, now employed by the United States lighthouse board, is the most effective signal used, and can be heard a distance of twenty to thirty miles. A class of fog signals are used on railways to indicate a safe distance at which trains may approach each other, or to indicate points of danger on the track, such as broken rails, landslides, and defective bridges. They are in the form of small torpedoes in which a detonating powder, when they are struck by the wheels of the engine, makes a loud report.

FOLEY (fō′lĭ), **John Henry,** sculptor, born in Dublin, Ireland, May 24, 1818; died Aug. 27, 1874. He studied at the Dublin Society of Art and at the Royal Academy in London. In 1839 he exhibited "The Death of Abel," and the following year gained a reputation by his "Ino and Bacchus." The latter gave him immediate recognition and in 1844 he was chosen one of the artists to do work in sculpture for the decoration of the houses of Parliament. Among his larger works is the colossal statue of Prince Albert, now in the Albert Memorial in Hyde Park. Foley designed the seal of the Confederate States of America, and executed a bronze statue of Stonewall Jackson for the State of South Carolina. In 1858 he was made a member of the Royal Academy. Among his later productions are "Youth at a Stream," "Death of King Lear," "Prospero and Miranda," and "Lear and Cordelia."

FOLGER (fōl′gẽr), **Charles James,** jurist and statesman, born in Nantucket, Mass., April 16, 1818; died in Geneva, N. Y., Sept. 4, 1884. After studying law, he was admitted to the bar of New York in 1839, and the following year settled in Geneva to practice his profession. In 1856 he joined the Republican party, was a State Senator from 1861 to 1869, and in the latter year became Assistant Treasurer of the United States in New York, under appointment by President Grant. In 1871 he was elected to the State court of appeals. He was chief justice of New York in 1880, and in 1881 became Secretary of the Treasury under President Arthur. As a candidate for Governor of New York, in 1882, he was defeated by Grover Cleveland with a majority of nearly 200,000.

FOLK, Joseph Wingate, public man, born at Brownsville, Tenn., Oct. 28, 1869. He attended public schools and graduated from Vanderbilt University. In 1890 he was admitted to the bar and established a large law practice at Saint Louis, where he was successful as district attorney in prosecuting a number of bribery cases. He was nominated on the Democratic ticket in 1904 as a reform candidate for Governor of Missouri and was elected with a vote much

larger than that of his party. His administration of the office was eminently successful and satisfactory to his constituents.



JOSEPH W. FOLK.

FOLKLORE (fōk'lōr), a term used to signify the scientific study of popular customs, tales, superstitions, and primitive belief and usages. The term was compounded from several German words employed to designate this study, such as *Volkslied* and *Volksfest*. Though many trivial matters are taken into cognizance, the study has marked value in that it throws light on the origin and development of political and religious beliefs and ceremonies, as well as different ideas regarding the relationship between races. It is this feature of folklore that has made it of special value to historians, sociologists, and writers on ethnology. Besides, through its study more comprehensive views have been formed. The science owes its origin to the Grimm Brothers, who began collecting stories as told by peasants, and after a research of more than twelve years published their collection. Soon after intense interest was aroused in the establishment of folklore societies, the founding of journals, and the publication of various books relative to these researches.

The American Folklore Society was founded in 1888 at Cambridge, Mass., and has directed its energies largely to the publication of books and periodicals relative to the folklore of North America. Its official publication is the *Journal of American Folklore*. Such institutions as Johns Hopkins University have given their energies to the furtherance of interest in the science. North American folklore has been extended largely within recent years, and now represents an interesting fund of knowledge relative to the Indians, Aztecs, and Eskimos. Institutions having a like object are maintained in the countries of South America and Eurasia. By means of extensive research it has been possible to add a very useful and extensive fund of knowledge to the history of primitive races.

FOND DU LAC (fŏn dū lăk'), a city in Wisconsin, county seat of Fon du Lac County, on the Fon du Lac River, about sixty miles northwest of Milwaukee. It is on the Wisconsin Central, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads. Being on Lake Winnebago, it has communication with the Great Lakes by the Fox River. It is surrounded by a fine farming and dairy region. Among its principal buildings are an opera house, the county courthouse, the high school, the public library, and Grafton Hall, an Episcopal school for girls. The manufactures include flour, ironware, woolen goods, furniture, machinery, and utensils. The municipal facilities include street railways, gas and electric lighting, pavements, waterworks, and several parks. It was settled in 1836 and incorporated in 1852. Population, 1910, 18,797.

FONSECA (fôn-sā'kà), **Manuelo Deodoro da,** first president of Brazil, born in 1827, died Aug. 23, 1892. After graduating at Rio Janeiro, he entered the army. In the War of 1865 between Brazil and Paraguay he distinguished himself and rose to the rank of major. Later he became imbued with republican ideas, succeeded to the governorship of Matto Grasso, and in 1889 led a revolution against Emperor Dom Pedro, in which the latter was expelled from the country. General Fonseca was made the first president of the republic, but, owing to his oppressive and self-seeking designs, his administration was brought to a close by a revolution and Vice President Peixto was elected to succeed him.

FONSECA BENEVIDES (bā-nā-vē'dăz), **Francisco da,** author and scientist, born in Lisbon, Portugal, in 1835. He was a son of a physician and studied medicine under the direction of his father, and in 1851 joined the navy. In 1854 he was made professor of physics in the industrial school at Lisbon, became a teacher in the naval academy in 1855, and the following year was chosen a member of the Lisbon Academy. The government appointed him as representative to a number of national expositions, in which capacity he attended Paris in 1878 to exhibit a line of scientific apparatus. His writings are devoted largely to history and scientific subjects. They include "Curso de physica," "O Fogo," "As rainhas de Portugal," and "Elementos de balistica."

FONTAINEBLEAU (fôn-tān-blō'), a town in the department of Seine-et-Marne, France, near the Seine River, about 37 miles southeast of Paris. It is a clean, quiet place with broad streets, and owes its fame chiefly to the palace of the kings. This is one of the most beautiful palaces in France. It was founded by Robert the Good in the 10th century and has been greatly improved by many succeeding kings. The chateau, or park, in which it is situated is a magnificent expanse of forest, in which are fountains, statues, flowers, and artificial lakes. Napoleon detained Pope Pius VII. as prisoner at Fontainebleau for two years. He signed his abdication here in 1814 and again in 1815. The town manufactures porcelain and wines and, owing to its extensive pleasure grounds, ranks as a favorite resort for visitors. Population, 1916, 14,381.

FONTENOY (fônt-nwä'), a village in the

province of Hainaut, Belgium, five miles southeast of Tourney. It is celebrated on account of a battle, on May 11, 1745, between the allied forces of Austrians, Dutch, and British and the army of France, each side numbering about 60,000 men. The French were commanded by Marshal Saxe and the allies by the Duke of Cumberland. The result was a forced retreat of the allies with a loss of 7,000 on each side.

FONVILLE (fôn-vyĕl'), **Wilfrid de,** aëronaut and author, born in Paris, France, July 26, 1828. He became a teacher of mathematics at an early age, but shortly after engaged in journalism and edited *Algérie Nouvelle,* which was suppressed by the government because of its revolutionary tendency. In 1858 he made a number of ascents in a balloon and became distinguished as an aëronaut, and in 1870 escaped from Paris in a balloon while that city was besieged. Subsequently he made ascents for the purpose of studying meteorology. As a journalist and lecturer he favored the republican form of government. His publications include "Fossil Man," "Thunder and Lightning," "Wonders of the Invisible World," and "How Republics Perish."

FOOCHOW (fōō-chou'), or **Fu-Chow,** capital of the province of Fo-Kien, China, situated on the Min River, about 25 miles from its mouth. Massive walls surround the city, while its streets and buildings show more than the ordinary Asiatic progress. In 1843 it was thrown open to foreign trade, since which time it has developed large manufacturing and commercial enterprises. It has extensive dockyards and an arsenal, which are under the direction of European influences. The city is the seat of several scientific societies and numerous missionary organizations. Population, 1918, 638,250.

FOOD, any substance that, being taken into the body of animals or plants, serves, through organic action, to build up normal structure or replace the waste of tissue. Plants feed on the carbonic acid gas of the atmosphere and a series of chemical compounds found in the soil. The living plants change the soluble air foods into plant tissues, cells, and granules under the influence of sunlight. Certain materials fitted to become the food of man or animals are stored in various parts of the structures, notably the roots, stem, and seeds, of which such as fats, sugar, starch, and proteids constitute the most noteworthy. Animals of the higher scale do not possess the power of changing the compounds of the soil and air into animal tissues. For this reason they feed directly upon the products of plant growth, or indirectly by eating flesh of other animals, and build up the complex animal muscle, fats, starches, and proteids, which are suitable for the food of man.

Liebig classified foods into those that serve for nutrition of organized tissue, or flesh-formers, known as *nitrogenized elements* of nutrition, and those which are consumed in respiration, or heat-givers, called *nonnitrogenized elements.* These elements exist in some form of combination in almost every substance known as food, and are subservient to the function of organic action in the process of digestion. The list of diets of most peoples includes fats and oils, the vegetable oils in the warm regions and the fats in the cold and temperate. Milk contains all the necessary food elements in the best form. Nitrogenous food-stuffs are found principally in the flesh of birds, animals, and fish; in milk, cheese, and eggs; in barley, wheat, oats, corn, and flour; and in beans, peas, and vetches. They are formed exclusively in plants, and undergo but little alteration when consumed as food and stored up by animals.

Fats are derived principally from milk, the bodies of birds and animals, and the blubber of sea animals. The oils are obtained mostly from the olive, the palm, the cocoanut, the rape, cotton seed, and fish. Corn and some other grains contain more or less oil substances and these, like most vegetable oils and fats, resemble those of animals. Starchy foods are of much importance in a normal diet. The starchy substances are derived mostly from the vegetable kingdom, and constitute the principal portion of the food of people who live in the tropical and temperate regions. The starches of the tubers, roots, grains, fruits, and milk embrace this class. These and other vegetable products contain hydrogen, oxygen, and carbon, but they differ in physiological properties from the oils. Water and salts are as essential for healthy nutrition as the proteid class, the former constituting 68 per cent. of the human body. It is one of the important constituent parts of many articles of food. Besides, there are accessory foods, such as vinegar, coffee, tea, relishes, and spices, which are used more or less habitually, though the exact nutritive value of many of them is not known definitely.

The body needs a variety of food to support the different tissues. In the economy of growth it is required that both the carbonaceous and nitrogenous elements be taken in sufficient quantities. The very instinct of man suggests the blending. Bread is eaten with butter; macaroni is prepared with cheese; rice is boiled with milk; pork is baked with beans, and other food articles are mixed similarly. Food is oxidized in each cell of the body, though only a small portion of the albumen eaten is required in their reconstruction; the remainder, and the fats and sugars, are oxidized without becoming a part of the living cells of the body.

The average man, in order to repair the waste caused by the oxidation of the cells, and to supply the requisite amount of heat and energy, must assimilate daily about four ounces of albumen, four of fat, and five of sugar or starch. To oxidize this it is necessary to breathe 24 ounces of oxygen. The weight of the body is increased by albumen being changed to fat, which occurs when more food is eaten than this

amount of oxygen can oxidize. An increase in the breathing capacity enables the body to oxidize more food and lessens the bad effects of overeating. Too much food causes plethora, while depriving the body of one kind of food for a considerable time causes it to suffer. When plain food is eaten slowly, hunger and taste are the most reliable guides as to quantity.

The subject of pure food has received much attention in the leading governments of Europe and America the past decade. This movement was brought about by widespread adulteration of medicine, beverages, and articles of food. The Federal food and drug act which went into effect on Jan. 1, 1907, is the most important legislation of this class enacted in the United States. This law made it unlawful to manufacture or sell within any territory of the Union, or to engage in the interstate or foreign commerce of any article of food or drug, which is adulterated or misbranded. This law requires that the weight marked upon a package shall be the actual weight, not an approximate weight. If drugs are imitations, they are held to be *misbranded.* Pure food laws have been enacted generally in the states of the Union and in the provinces of Canada.

FOOLS, Feast of, a festival celebrated for several centuries in a number of countries of Europe, especially in France and Spain. It was a season of Christian merrymaking and partook of a childish character. The festival was celebrated more or less during the entire period between Christmas and Epiphany (Jan. 6), but belonged especially to Innocent's Day (Dec. 28). It resembled the Roman Saturnalia, and the chief participants included the subdeacons and laity. In the exercises they chose a mock bishop, archbishop, or pope, who presided at the meeting in the church, and the rites of Christianity were gone over in the ceremonies. Dancing, the singing of commonplace songs, and the wearing of masks and disguises were practiced. The Protestant Reformation counteracted the extravagancies of these festivals and put an end to them in Germany and England, but they survived in France until 1644.

FOOT, a unit of linear measurement, containing 12 inches. A surface, each side of which is 12 inches, is a square foot, and is equal to 144 square inches. A cube whose sides are 12 inches is a cubic foot and contains 1,728 cubic inches. The foot unit was derived from the human foot. It is used extensively as a common measure, though its length varies in different countries. In music and poetry, a foot is a term used to denote a melodic figure of notes with only one accent, or a succession of accented or unaccented syllables, which, being repeated, produce rhythm. The four principal feet in England poetry are the anapest, the dactyl, the iambus, and the trochee.

FOOT, the extremity of the leg below the ankle, and on which the body is supported. In man the foot is composed of seven tarsal and five metatarsal bones, so arranged and connected as to form an arch from the extremity of the heel to the ball of the toe, and the phalanges. The bones, where they articulate with one another, are covered with a considerable layer of elastic cartilage. Between the bone at the heel and the ends of the metatarsal bones is a heavy ligament known as the *plantar ligament,* which not only holds the bones together in the form of an arch, but protects the blood vessels, nerves, and muscles that lie above it in the hollow of the foot. Another very strong, elastic ligament holds the heel bone and the central bone of the arch together. The head of the key bone, upon which the tibia sits, rests upon this ligament. The different motions of the foot are effected by five muscles. They include the *calf,* attached to the thigh and leg and below by the tendon of Achilles to the heel bone, which is the largest tendon in the body and sustains its weight in walking; the *posterior tibial,* attached at one end to the tibia and the other to the instep bone (scaphoid); the *short fibular,* attached to the fibula at one end and to the outer metatarsal bone at the other; the *anterior tibial,* which raises the toes and turns the foot outward; and the *third fibular,* whose tendons pass in front of the ankle on either side of the foot and raise the inner or outer border of the foot. The bottom of the foot is padded with fat and covered with a strong, tough skin. It forms the *sole* of the foot.

FOOT AND MOUTH DISEASE, an infectious disease common to domestic animals, especially swine and cattle. It occurs most frequently in Europe and Asia, but sometimes spreads to Africa and other continents. During a wide-spread attack of the contagion, it sometimes affects sheep, goats, and man, being conveyed to the last mentioned by the use of milk or meat from diseased animals. It is often fatal to young animals, but in adults it partakes of a lighter form, usually as a fever or constitutional weakness. The bacteria which causes the disease is not well understood, but it is known that the period of incubation is from three to six days, and that the virus may be destroyed by exposure to sunlight or antiseptics, such as formaldehyde and carbolic acid. Animals affected have symptoms like those of pneumonia and bronchitis and their feet, mouth, and other parts are subject to eruptions from which virus exudes. The treatment recommended is that affected animals be separated from others and quarantined, and the affected parts may be treated with antiseptic solutions.

FOOTBALL (fo͝ot'bạl), a popular game played by pupils in the higher grades of the public schools and by students of colleges and universities, especially during the colder season of the year. It is an ancient game, having been popular during the prosperous eras of ancient Greece and Rome. The northern countries of

continental Europe adopted it about the time of the Roman invasions, while the Danes popularized it in England, where it became famous as a Shrove Tuesday sport as early as the 12th century. Though popular for centuries, it has taken a wider hold on the world of sport within recent years and is played with an ever-increasing fervor. Among the numerous and widely known associations are those called Rugby Association, Australian, and American Intercollegiate. Each of these and many others have definite rules, under which the members practice in the art of playing, and at specified times engage in competitive games with other associations. The associations organized at Harvard, Princeton, Yale, and the University of Pennsylvania have been known as the *Big Four,* while similar association ties have been accorded to the Western, Canadian, Indian, and other groups of organizations.

The game is played by teams of from 11 to 22 players, upon a level field. Scoring is possible in the field of the opposing side, either by getting the ball through or over a goal, or by passing it over a certain line. Each side, therefore, with the view of scoring, sends the ball in the direction of the opponents' end of the field. This may be done in two ways—by kicking and running, or by advancing it in any way except by running. The field is usually 160x300 feet, and the ball is made of leather, having a large ellipsoidal form. Among the officials are two linemen, an umpire, and a referee. The losses and advances on either side are watched by the linemen, fouling is prevented by the umpire, and the referee keeps account of the ball. In most associations the entire time of the game is 60 minutes, divided into two portions of 30 minutes, with an intermission of 15 minutes intervening. The principal rules are known as the *Association Rules* and the *Rugby Rules.*

FOOTE (fo͝ot), **Andrew Hull,** naval officer, born in New Haven, Conn., Sept. 12, 1806; died in New York, June 26, 1863. In 1822 he entered the navy as midshipman, became lieutenant in 1830, and captain in 1849. When the Civil War commenced, he was given the command of the western flotilla. He was accorded a vote of thanks by Congress for valuable service rendered in the capture of forts Henry and Donelson and Island No. 10, and soon after was made rear admiral. In the capture of Fort Donelson he was wounded, and subsequently was placed in charge of the bureau of equipment and recruiting. In 1863 he was given command of the fleet off Charleston, but died before reaching the place where he was to operate.

FOOTE, Arthur, composer, born in Salem, Mass., March 5, 1853. He became interested in the study of music at an early age, and in 1874 graduated as a student of music at Harvard University, where he afterward took supplementary work. Later he studied piano and organ playing with B. J. Lang, and chose Boston as his home, devoting his time to organ and pianoforte recitals. He composed many works for the piano and the orchestra, among which is much church music. His compositions include "In the Mountains," "Skeleton in Armor," "The Wreck of the Hesperus," and "Farewell, Hiawatha." He composed about one hundred songs, including "On the Way to Kew," "Irish Folk Song," "O Swallow, Swallow," and "I'm Wearing Awa'."

FOOT ROT, a disease common among sheep. The most prevalent form is due to an unusual growth of hoof, which causes the margin or toe to turn downward and ultimately crack, thus causing openings in which dirt and sand readily lodge. As a consequence the feet become swollen and ultimately ulcerated between the toes, where proud flesh forms and causes decay.

FORAGE (fŏr'åj), a term used to designate any food suitable for horses, cattle, and sheep, including such as hay, straw, and ensilage. Among the forage plants cultivated extensively are clover, orchard grass, alfalfa, timothy, corn, broom corn, and sorghum. However, the straw and chaff of many cereals, such as wheat and oats, are important animal food products. The species of plants cultivated for forage depend upon the temperature and aridity quite as much as upon the different kinds of soil. In many portions of the West native grasses still constitute an important forage crop, while in the East and the arid regions of the far West forage plants are grown with a high degree of care. In the West and Southwest, where moisture is supplied by irrigation, the larger forage plants are cultivated extensively, such as alfalfa, sorghum, and millet.

FORAKER (fŏr'å-kĕr), **Joseph Benson,** statesman, born in Rainsboro, Ohio, July 5, 1846. His boyhood was spent on a farm. In 1861 he entered the Union Army, serving until the end of the war. By faithful service he attained to the brevet rank of captain, and was aid to General Slocum's staff when mustered out. Shortly after the close of the war he entered Ohio Wesleyan University as a student and in 1869 graduated at Cornell. He was admitted to the bar of Ohio the same year. In 1879 he became judge of the superior court at Cincinnati, serving three years. He was elected Governor of Ohio as a Republican in 1885, which office he held until 1890. He was chosen as successor to Senator Brice in 1896 and was reëlected in 1902 for the term ending in 1909. In the Senate he was conspicuous as an opponent to the railway rate regulation favored by President Roosevelt, with whom he engaged in a controversy regarding the Brownsville, Tex., riot (Aug. 14, 1906) He died May 10, 1917.

FORAMINIFERA (fō-răm-ĭ-nĭf'ē-rå), a group of small animals, classed with the mol-

lusks on account of having beautiful shells. However, a few of the species are naked, while many have very complicated and remarkable coverings. They belong to the protozoan group and, like them, reproduce in all three ways common to that form of life. The species are widely distributed, but are most common in salt water. Fossils of these animals are very numerous, and vast beds of rock are constructed almost entirely of their shells. The chalk cliffs of England and the Silurian beds of Russia are examples of fossils of these animals.

FORBES (fôrbz), **Archibald,** special war correspondent, born in Morayshire, Scotland, in 1838; died March 31, 1900. After studying at Aberdeen University, he served for several years in the royal dragoons. In the Franco-German War of 1870-71 he was the special correspondent of the London *Daily News.* He afterward reported the events of the communistic rising in Paris, those connected with the tour made by the Prince of Wales in India, and later those of the Russo-Turkish War. In 1879 he followed the armies in the South African campaign, during which he rode 110 miles in fifteen hours to report the victory gained at Ulundi. Later his various writings were published in book form, as were also the events in connection with his lecture tours in Australia and America. Among his productions are "Drawn from Life," "Bivouacs and Battles," "Glimpses Through the Cannon Smoke," "Afghan Wars," "Students of War and Events," "Life of Napoleon III.," and "Life of William I. of Germany."

FORBES, Sir John, physician, born in Banffshire, Scotland, Oct. 18, 1787; died Nov. 13, 1861. He studied at Marischal College and became an assistant in the navy. In 1817 he was awarded a degree in Edinburgh. Subsequently he practiced medicine in Chichester and London, where he became the physician to the Prince Consort and later to the queen. In 1853 he was knighted. Besides being noted as a physician, he took high rank as a phrenologist and was a believer in mesmerism. He edited the "Cyclopaedia of Practical Medicine" and published "Nature and Art in the Cure of Disease."

FORCE (fōrs), an exertion or influence that, if made to act on a body, has a tendency to affect or stop it if in motion, or to move it when at rest. Light, heat, gravitation, electricity, motion, cohesion, magnetism, and chemical affinity are thought to be manifestations of the force from which originate all phenomena of the material world. Mechanical force originates from life, gravitation, and the sources of heat, light, and electricity. Two systems are used for measuring force, the Metric system and the English system, the dyne being the standard of measure in the former and the poundal in the latter. To measure the effect produced by any mechanical force it is necessary that three things be known—the point of application at which the force acts, the direction in which the force acts, and the intensity with which it acts. When two or more forces act in the same direction, the resultant is equal to the sum of the forces. If two equal forces act in opposite directions, thus opposing one another, the body acted upon remains at rest, but, if the forces acting are unequal, it moves in the direction of the greater with a force equivalent to their difference. Two forces acting at an angle with each other produce a resultant in an intermediate direction, the force of which equals the mean of the two acting forces. The *resolution* of a force is the separation of it into the components which produce that force, and the *composition* of forces is the combining of two or more into one.

Various terms are used to designate forces according to their nature and the manner in which they act. The most common classification includes parallel forces, constant forces, accelerating forces, resultant forces, uniform forces, and variable forces. By *parallelogram of forces* is meant the method of determining the direction and intensity of two forces, while *unit of force* implies a single force, whose terms being known, serves as a unit to ascertain the amount of any other force. The force exerted in a direction outward from the center, by a body moving in a circular path, is called the *centrifugal force,* while the *centripetal force* is exerted from without toward the center. Since the centrifugal force is a consequence of the rotation, it ceases when the centripetal force ceases, and the body moves in a straight line known as a *tangent.* The area in which a force acts is called the *field.* Centrifugal force is proportional to the mass and to the square of the velocity of the rotating body. If the mass of the rotating body be doubled, it requires twice the amount of force to prevent it from moving away from the center of motion, and, if the velocity be doubled, four times the force is necessary for it to retain its position. The motion of the planets around the sun affords good illustrations of centrifugal and centripetal forces. These bodies constantly tend to move away from the sun by reason of the motion originally given to them, while the attraction of the sun holds them in an almost circular path.

FORCE, Peter, historian, born at Passaic Falls, N. J., Nov. 26, 1790; died Jan. 13, 1868. He took up the trade of printer in New York City. In 1815 he removed to Washington, D. C., where he published the *National Calendar,* an annual treating of statistical information. In 1823 he began the publication of the *National Journal,* which was the official newspaper of the administration of John Quincy Adams. He was mayor of Washington in 1836-40. His most valuable work, entitled "American Archives," is a history of the American colonies and was

published by the direction of an act of Congress. He is regarded an authority on literature relating to discoveries in the Arctic Ocean and published "Record of Auroral Phenomena Observed in the Higher Northern Latitudes."

FORCE BILL, the name applied to several bills passed by the Congress of the United States. In 1828 a protective tariff act created much discontent and South Carolina claimed that the State had power to nullify objectionable Federal enactments. Congress passed a bill to enforce the tariff law in 1833, known as the Force Bill or the Bloody Bill. A bill for the enforcement of the Fourteenth and Fifteenth amendments to the Constitution became law May 31, 1870. It made punishable by fine or imprisonment all attempts at intimidation, bribery, or hindrance in the matters of registration and qualifying for voting. A much more stringent law was enacted in 1871 to put down the conspiracies against civil rights by the Ku-Klux Klan. The name Force Bill has been applied to the Lodge election bill which passed the House July 2, 1890, "to amend and supplement the election laws of the United States, and to provide for a more efficient enforcement of such laws." This bill was defeated in the Senate by a combination of those who favored the adoption of free coinage legislation.

FORD, Paul Leicester, historian and novelist, born in Brooklyn, N. Y., in 1865; died in 1902. He was instructed in private schools in his native city and traveled extensively in America and Europe. His writings exhibit evidences of careful research and deep study, a fact due largely to the circumstance that he was a cripple and could not enjoy the usual institutional instruction. Among his historical works are "The True George Washington," "The Writings of Thomas Jefferson," and "The Many-Sided Franklin." His chief works in fiction are "Tattle Tales of Cupid," "The Honorable Peter Sterling," and "Janice Meredith."

FOREST (fŏr'ĕst), a large tract of land covered with a natural growth of trees and underbrush, though often with intervening spaces of open ground. The countries of Europe have provided protection by law, by which it is designed to preserve the forests for judicious use and prevent wholesale and needless destruction. Such acts of preservation operated to preserve many desirable tracts in Austria, Germany, France, and other countries, of which Epping Forest, near London, is a good example. Similar laws have been passed in Canada and the United States, and, besides, there has been legislation aiming to extend rather than abridge the forest area. The timber-culture law passed in the United States in 1872 remained in force 21 years, and provided that 160 acres of the public domain could be acquired by cultivating ten acres of trees for a period of eight years. Under this act about 50,000,000 acres of trees were planted and cultivated in the great prairie regions of the West. The Nebraska State board of agriculture in 1874, under the suggestion of J. Sterling Morton, recommended that a day be dedicated each year to the planting of trees. This suggestion was acted upon by all the states and territories, not only through individual effort, but by the formal effort of public schools. As a conse-



quence many trees and tracts of timber have been planted and cultivated on private and public property. See **Arbor Day.**

Natural forests are found widely distributed where moisture is abundant and the temperature is favorable to plant growth. The forests of the Torrid Zone are the most luxuriant and cover vast areas along the streams and bodies of water, even to a considerable height above sea level. As we proceed north and south from the Equator we find the forests gradually decreasing in density and size of trees up to the higher latitudes, where they finally become rare and gradually disappear. The most extensive forests of the world are found in the valleys of the Amazon and Orinoco, the lake region of Africa, and in the southern parts of Eurasia. The higher altitudes, even in tropical countries, are destitute of forest growth, though plant life thrives in such regions at a much higher elevation than in the Temperate Zone and extends far into the higher latitudes, even to regions having much soil perpetually below the freezing point of water.

The forest area of the United States is placed by the Department of Agriculture at about 500,000,000 acres. Alaska has excellent timber and comparatively little of it has been put on the market. The output of lumber in the United States is 30,500,000,000 feet annually, of which the largest part is obtained in Wisconsin, Michigan, Minnesota, and on the Pacific coast. About one-fourth of the output is obtained in Michigan, Wisconsin, and Minnesota, which states yield an excellent quality of pine, hemlock, and the hard woods. Pine, fir, and spruce lumber is obtained in large quantities in Oregon, Washington, and California. The product is used chiefly in manufactures, railway construction, fencing, for building purposes, and for fuel. While there is danger of the visible supply decreasing beyond legitimate limits, the larger use of steel for construction purposes is relieving notably the demands annually made upon the forests. Besides, the consumption is affected by the increased use of coal, gas, and electricity for motive and heating purposes.

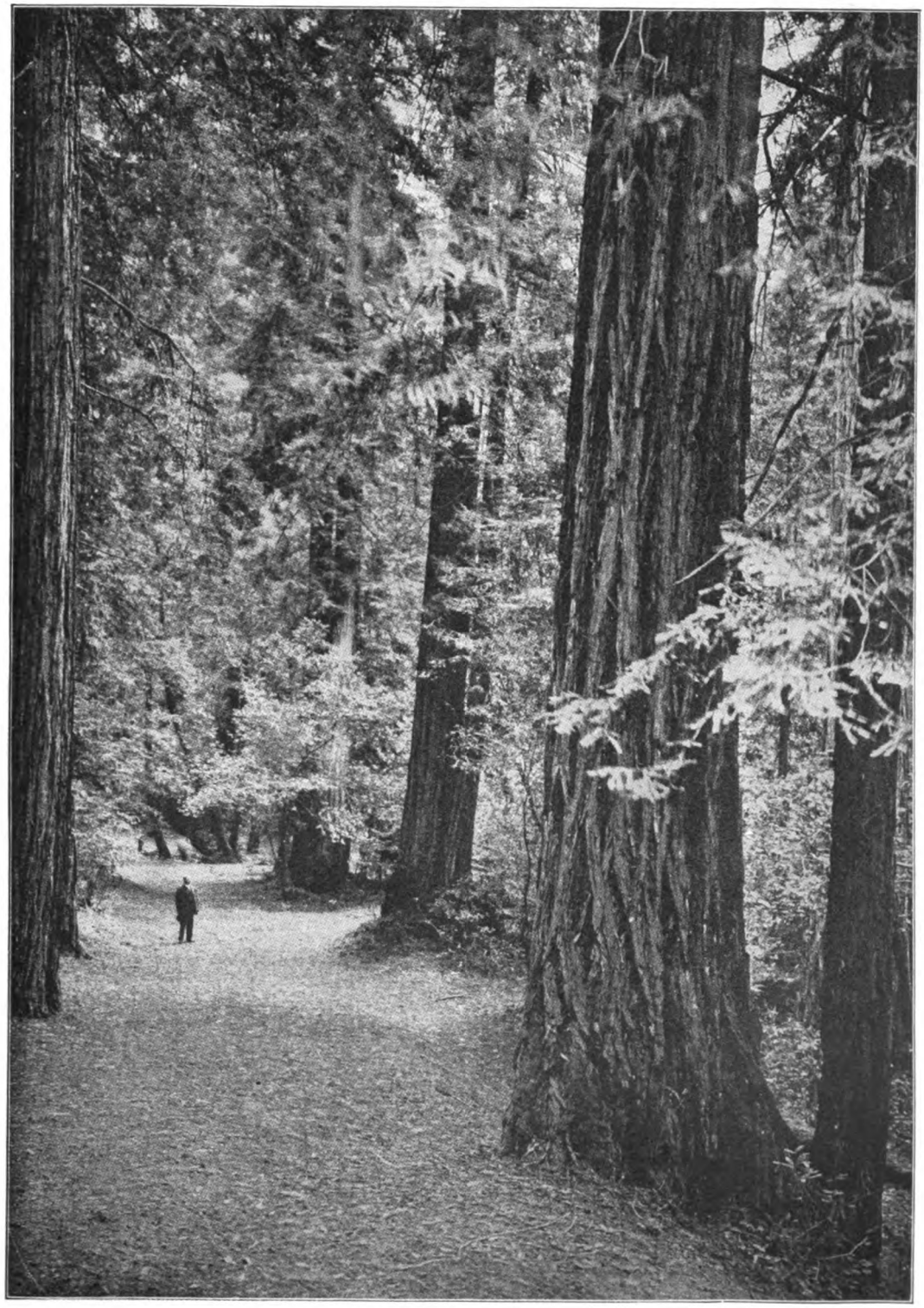
Forests are the natural home of many birds and wild beasts and have marked utility for their influence upon the occupations of man. They supply material for dyes, medicines, and numerous articles of value in the arts. The soil is enriched by the decaying trunks and foliage of trees. They furnish shelter from winds and storms in the winter and are a protection against the scorching heat of the summer. Their roots penetrate the soil and facilitate the entrance of water after rains and the shadow of their branches retards evaporation. In this way they extend the surface of moisture and visibly affect rainfall. This point of advantage is further accelerated by the fact that forests prevent accumulated snows from melting rapidly, thereby counteracting floods, such as result where the forest area is robbed of its timber. Where forests do not abound, the rainfall rapidly runs off the surface and finds its way back to the ocean. Besides causing floods, this tendency visibly influences temperature and productiveness.

The forest areas in the United States equal about one-third of the area of the country, exclusive of Alaska. About seven-tenths of the timbered area is between the Mississippi and the Atlantic coast. Of the entire forest wood 75 per cent. is coniferous, which requires about three-quarters of a century to grow to maturity. Timber of much value is obtained from the Philippines, where the forest areas exceed 40,000,000 acres. Canada has about a million square miles of standing timber and contains the largest white pine areas in the Western Hemisphere. The annual production of lumber aggregates $80,000,000 per year, about one-third of which is exported to the United States. Russia has the largest forest areas in the world, a total of 812,640,600 acres, three-fourths of which belong to the government. Forest fires and the clearing of the ground for cultivation are prolific sources of forest destruction. Great carelessness has been displayed in lumbering and in setting fires to brush left on the ground after the more valuable trees have been cut. However, the government has displayed much wisdom in protecting the forests and in encouraging schools of forestry.

FORESTERS, Ancient Order of, a fraternal organization founded in Yorkshire, England, in 1745. Though it has been maintained continuously since that time, its material growth dates from the early part of the 19th century. The first court was established in America in 1832, at Philadelphia, Pa., and since then it has spread rapidly in Canada and the United States. In 1908 it had about 9,500 courts, with 1,000,000 members, of whom about 50,000 were in Canada and the United States. Courts are maintained in 36 countries. It is one of the largest beneficiary societies of the world. The benefits distributed annually aggregate $5,000,000.

FORESTERS, Independent Order of, a society founded in 1874 at Newark, N. J. It was reorganized in 1881 and maintains courts in Canada, the United States, Great Britain, Australia, and other countries. The society has about 5,000 local courts, which are under the direction of high courts, and the general government is vested in a supreme court. The order is both fraternal and benevolent, has 240,000 members, and has disbursed in benefits about $49,500,000 since its organization.

FORESTERS OF AMERICA, a benevolent and fraternal society, reorganized under its present name in 1895. It originated from the Ancient Order of Foresters (q. v.), introduced in America in 1832, but separated from



(Opp. 1032)

A REDWOOD FOREST ON THE PACIFIC COAST OF NORTH AMERICA.

the mother organization in 1889. In 1908 it had 1,750 courts and 250,000 members. The annual payments as benefits approximate $1,125,000. Since its organization about $23,500,000 has been disbursed.

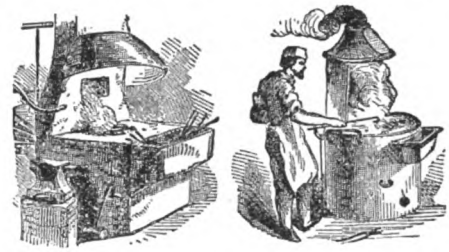
FORESTRY, the management and preservation of trees in communities. This branch of economic study is concerned with the planting of trees and the utilization of both cultivated and native forests with the view that the best possible good may be obtained. Man has been the worst enemy of forests in America since the discovery of this continent. Lumbering has greatly lessened the visible supply, but forests are also destroyed by insects, fungous diseases, drought, forest fires, and the grazing of animals. Attention has been directed to forestry both with the view of planting new forests and preserving old ones, and it is designed to prevent ruthless destruction as well as to utilize to the best advantage the supply of timber for fuel and for construction.

Forestry has been a branch of study in the institutions of Europe for many years, especially in Germany, whose foresters are considered the best prepared and most skillful in the world. The need of some rational system of forest management is recognized by the leading nations. Canada has forest reserves of about 12,500,000 acres and has a well-disciplined corps of officials to aid in diffusing knowledge of forestry and protecting the forests on the public lands. The Bureau of Forestry, established in 1901 under the Department of Agriculture, is an important branch of the government in the United States. The chief aim is to develop scientific forestry. In literature sent out by this bureau the benefits of studying forestry are shown, which include an investigation of climatic influences upon shrubs and trees.

Among the advantages of forests are that they conserve moisture and thereby increase rainfall. They temper hot and cold winds and are useful in reclaiming tracts of almost barren land. The benefits of wind-breaks are seen on the great prairies of Canada and the United States, where innumerable hedges and groves have been planted. Parks and clusters of trees furnish covering for birds and add to the enjoyment of man. The schools of forestry aid in studying the adaptation of various trees to particular localities, especially as they are influenced by soil, moisture, and temperature, and much valuable information has been given in regard to the selection of land for reforestization and the care to be given growing trees.

The interest in forestry is promoted not only by the general government, but likewise by the several states and minor subdivisions. In 1885 New York created a forest commission, and that State has a reservation in the Adirondack and Catskill regions amounting to 1,250,000 acres. Constitutional provisions for forestry have been made in many states, while in others the regulations are by legislative enactments. Colleges of agriculture have placed forestry in the regular courses and the American Forestry Association has promoted interest by holding meetings and issuing reports.

FORGE (fōrj), an open fireplace or hearth with forced draft for heating iron, steel, or other substances. The term is also applied to a workshop where metals are hammered and shaped by the aid of heat. Forges were formerly made of brick, with a large leather bel-



BLACKSMITH'S FORGE. PORTABLE FORGE.

lows to furnish the blasts of air, but at present are made largely of iron and the blast of air is obtained from a rapidly rotating fan wheel. All heavy forging is done by hammers run by machinery. In the great Krupp works at Essen, Germany, is the largest forge hammer in the world. It is constructed so skillfully that it can be manipulated to gently crack a small nut or sufficiently forceful to crush a thick bar of iron.

FORGERY (fōr'jĕr-ў), in law, the act of falsely making or materially altering a writing or written instrument, with intent to defraud. Forgery consists essentially in making a false instrument appear to be legal and genuine. It is a grave offense, punishable by fine or imprisonment in the penitentiary. The national governments of all countries provide punishment for forgery by legal enactments, and additional protection is provided by laws in the states and provinces. In most countries the Federal government has exclusive jurisdiction of cases which arise from forging, uttering, or publishing as true any papers relating to the nation, while the states and provinces have jurisdiction of those arising under their laws. The false making or altering of papers with intent to defraud are not the only defenses that come under the head of forgery, but such offenses as changing records and altering brands or stamps are included.

FORGET-ME-NOT (fôr-gĕt'mē-nŏt), a genus of plants generally diffused over the North Temperate Zone. The flower is small and is blue in most species. It has five petals and a salver-shaped corolla. On account of its brilliancy of color, and, being the emblem of constancy in friendship and love, it is a favorite flower in most countries. The dark blue

forget-me-not of the Azores is cultivated extensively. The present name is from the German *Vergiss-mein-nicht,* while the former English name, *scorpion grass,* is rarely used.

FORKS. See **Cutlery.**

FORLORN HOPE (fôr-lôrn'), a military term applied to a body of men selected from an army for the performance of some exceptionally dangerous duty, such as leading the assault upon a fortress or heading a perilous charge in battle. Those who undertake such a task usually are volunteers, and a liberal reward is generally given to those who survive.

FORMALDEHYDE (fôr-măl'dĕ-hīd), a colorless, volatile liquid, chemically intermediate between formic acid and mythol alcohol, discovered by Hofmann in 1867. It is used in making dyes and as a disinfectant.

FORMIC ACID (fôr'mĭk), a simple fatty acid of organic chemistry, so named from its being found in the bodies of ants. It is prepared artificially by dissolving sugar, starch, or tartaric acid in water, then adding sulphuric acid, and distilling the mixture on peroxide of manganese. Pure formic acid solidifies at a low temperature, forming a crystalline mass. It is strongly acid, colorless, and transparent, and has a pungent odor. It is very corrosive and, when placed on the skin, causes intense irritation.

FORMOSA (fôr-mō'sȧ), or **Taiwan,** an island lying off the eastern coast of China, in the Pacific Ocean. It is separated from the province of Fo-Kien by a strait about 85 miles wide. The island has a length of 240 miles, an average breadth of 72 miles, and an area of 13,418 square miles. The surface is mountainous, especially in the interior. Mount Morrison is the culminating peak, having a height of 14,360 feet. A part of the surface is made up of barren clay hills, but the plains and valleys are fertile. Among the principal products are sugar, rice, silk, tea, tobacco, camphor, vegetables, coal, and fruits. The climate is favorable and healthful and the rainfall is abundant. Formosa was opened to foreign trade by the Treaty of Tien-tsin in 1858, when Takow, Tainan, Anping, and Tamsui were made free ports. Japan, China, and Great Britain have the principal part of the trade.

China undertook to explore and settle Formosa as early as 603. The Dutch controlled a large portion of the island in the 17th century, but it remained a Chinese territory the greater part of the time. About 500,000 Chinese immigrants settled in the western portion during the Chinese occupation of the island. They greatly modified the industries which prior to that time were under the exclusive control of the Malays. After the war between China and Japan, in 1895, it was ceded to the latter country by treaty, and now constitutes a Japanese possession. A native revolt occurred in 1897, but it was suppressed by the government, and local officials were enjoined to show a spirit of fairness and benevolence in the administration of public affairs. Many schools and public institutions have been established by the Japanese. The native inhabitants are chiefly Hakkas and the aboriginal tribes and clans. Population, 1916, 3,581,962.

FORREST (fŏr'rĕst), **Edwin,** noted tragedian, born in Philadelphia, Pa., March 9, 1806; died there Dec. 12, 1872. He first played on the stage in 1820. Six years later he appeared at the New York Bowery Theater, where he made a signal success in the character of *Othello.* In 1836-37 he played with success in London and afterward visited other European cities. He made a second visit to London in 1845 in company with his wife and performed at the Princess' Theater. His successes were principally as *King Lear, Richard III.,* and *Coriolanus.* Intense jealousy arose between Forrest and Macready, the favorite actor of the English stage, which caused the former to lose favor in Britain. In 1849 Macready played in New York City, which gave rise to a riot and resulted in the death of twenty rioters. For this affair Forrest was criticized severely, although it was due rather to the native American spirit of the period rather than to any fault on his part. He made his last appearance on the stage at Boston in 1871. His success as an actor is attested by universal approval and an accumulation of a fortune amounting to $1,000,000. After leaving the stage, he built a beautiful mansion on the banks of the Hudson, erected an imposing house in Philadelphia, and left his fortune chiefly for the purpose of founding a home for poor members of his profession.

FORREST, Sir John, explorer, born in Western Australia, Aug. 22, 1847. He was educated at Perth, where he attended the Bishop's School, and in 1865 entered the survey department of Western Australia. In 1869 he commanded an exploring expedition into the interior, and the following year explored the region from Perth along the south coast to Adelaide. He showed that it was practicable to construct a telegraph line across the continent, and the government acted upon his suggestion in 1876. In 1874 he explored the region between Adelaide and Port Darwin, making a journey of nearly 2,000 miles. For these services he received the gold medal of the Royal Geographical Society of London. In 1887 he represented Western Australia at the colonial conference in London. He was chosen Minister of Defense of the Commonwealth of Australia in 1901 and three years later became Minister of State for Home Affairs. He published "Explorations in Australia."

FORREST, Nathan Bedford, soldier, born in Bedford County, Tennessee, July 13, 1821; died in Memphis, Oct. 29, 1877. He first engaged in the occupation of a planter, became a

slave dealer, and in 1861 raised a cavalry regiment to defend Fort Donelson for the Confederates. During the war he fought at Shiloh, Murfreesboro, and Chickamauga, became major general, and in 1864 captured Fort Pillow by a skillful assault. Soon after he was promoted lieutenant general. He was defeated by General Wilson in 1865 and surrendered a month later at Gainesville. Subsequent to the war he engaged in several railroad enterprises.

FORSTER (fôr'stĕr), **Johann Reinhold,** traveler and naturalist, born in Dirschau, Germany, Oct. 22, 1729; died Dec. 9, 1798. He entered upon the study of theology at Halle and was ordained pastor at Nassenhuben, but continued to pursue his favorite studies of geography, mathematics, and history. In the second voyage of Captain Cook, he accompanied that navigator around the world and made many valuable researches. His description of the voyage was published in 1777. He became professor of natural history at Halle in 1780, where he labored in that capacity until his death. Among his writings are "History of Northern Discoveries," "Researches for Truths," and "Zoölogical Research."

FORSTER, John, political and historical writer, born in Newcastle, England, April 2, 1812; died Feb. 1, 1876. He was the son of a Unitarian and secured a good education in mathematics and the classics. In 1832 he published "Lives of Eminent British Statesmen." Among his writings are "Life of Dickens," "Life and Times of Oliver Goldsmith," "Debates on the Grand Remonstrance," and "Life of Swift."

FORT COLLINS, county seat of Larimer, Colorado, 74 miles north of Denver, on the Cache la Poudre River and on the Union Pacific and other railroads. The features include the high school, federal building, Y. M. C. A., public library, and Colorado State Agricultural College. It has gas and electric plants, street railways, and a large trade in merchandise and farming produce. The place was settled in 1864 and incorporated in 1873. Population, 1910, 8,210.

FORT DEARBORN. See **Dearborn, Fort.**

FORT DODGE, a city of Iowa, county seat of Webster County, on the Des Moines River, about 85 miles northwest of Des Moines. It is on the Chicago Great Western, the Illinois Central, the Minneapolis and Saint Louis, and other railroads. Intercommunication is by electric urban and interurban railways. The chief buildings include the post office, the county courthouse, the public library, the high school, the First National Bank, and a number of fine churches. Among the manufactures are flour, ironware, clothing, oatmeal, tile, pottery, stucco, and machinery. The surrounding country is fertile, possesses extensive dairy interests, and is rich in coal, gypsum, and fire clay deposits. Among the municipal facilities are paved streets, waterworks, electric and gas lighting, and a system of sanitary sewerage. It has a large trade in cereals and merchandise. Population, 1905, 14,369; in 1910, 15,543.

FORT DUQUESNE (dụ-kān'). See **Pittsburg.**

FORT ERIE. See **Erie, Fort.**

FORT FISHER (fĭsh'ẽr), a fortress below Wilmington, N. C., at the entrance to Cape Fear River. General Butler led a force of 6,000 men against the fortress in December, 1864, and was aided by Admiral Porter with a fleet of ironclads. The project of taking the fortress was abandoned after two days, but on Jan. 13, 1865, a second attempt was made by General Terry and Admiral Porter, which resulted in its capture. The Union army took 2,000 prisoners and 170 heavy guns.

FORTH, a firth and river of central Scotland, formed by the confluence of the Dhu and Duchray in Perthshire. The river is 170 miles long and merges into the Firth of Forth, a body of water extending fifty miles east from Alloa to the North Sea. It has important salmon and herring fisheries. The celebrated Forth Cantilever Bridge, a railway viaduct at Queensferry, is 4,000 feet long. This bridge is 8,295 feet, or about a mile and a half long, and the cantilevers cover about one mile. It was completed in 1889 at a cost of $13,000,000.

FORTS HENRY AND DONELSON, two forts erected by the Confederates in Tennessee, near the border of Kentucky. Fort Henry was located on the Tennessee River, about twelve miles from Fort Donelson, which was on the Cumberland River, being about forty miles from where these rivers flow into the Ohio. They were strongly manned in 1861 and constituted important strategic points, since they controlled the entrance into the Southwest by means of the Cumberland and Tennessee rivers. General Grant, assisted by a river fleet under Commodore Foote, decided to attack Fort Henry on Feb. 2, 1862. On the 6th Commodore Foote made a vigorous attack and compelled the surrender of the works, but the Federal military forces were delayed and the Confederate garrison meanwhile escaped to Fort Donelson. General Grant made a vigorous attack upon the latter on Feb. 13, 1862. Two days later General Buckner addressed a communication to General Grant in which he requested that a commission be appointed to settle upon terms of capitulation. To this Grant sent his famous reply: "No terms except unconditional and immediate surrender can be accepted. I propose to move immediately upon your works." The terms were accepted by Buckner, who surrendered 14,000 prisoners.

FORTIFICATION (fôr-tĭ-fĭ-kā'shŭn), a military defensive work, erected for the purpose of strengthening a place or position. The term also applies to the science of fortifying a position in such a way that it may be held by a body of men much inferior in numbers to

their assailants. It implies a knowledge of the resistant power of materials as well as advantage in positions, so the construction may be devised in a manner that the enemy in attacking must of necessity suffer great loss. Defensive works are either regular or irregular as to construction, and, with respect to time, are distinguished as *permanent* and *temporary*, or *field*, fortifications.

The history of fortifications is as old as that of offensive and defensive warfare, though the process of construction has undergone numerous modifications, which were necessitated largely by the modern improvements in the implements of war. The student of history finds numerous references to defensive fortifications as the different peoples are studied. Thus, we recall the story of Troy, in which it is related that the city stood safely against the Grecians until the colossal wooden horse was taken within its walls against the admonition of Laocoön. The walls of Babylonia were 32 feet thick, 100 feet high, and strengthened by great towers. The walls of Jericho resisted the invading hosts of Israelites, and, according to the Scriptures, crumbled before them only after divine aid was extended. Many ancient walls of Asiatic cities still remain. Though having answered a good purpose in resisting the attacks with battering rams and ancient implements, they serve but illy when brought to a test against modern ordnance.

Soon after gunpowder became known to the Europeans, the modern nations began to devise new implements of war, and likewise sought to counteract their effect by powerful works of defense. The Italians began in the 15th century to construct bastions, while the French engineer, Sébastian de Vauban (1633-1707), who served under Louis XIV., developed the *bastion system* to such an extent that it still prevails in France as the general type of fortifications. However, this system has given way largely in most countries to the German *polygonal system*, which is sometimes called the caponiere system on account of employing numerous caponieres to span ditches, thus utilizing them instead of bastions for defensive purposes.

In constructing field fortifications, engineers take advantage of position with the view that the enemy will be exposed to fire and cross fire in making the attack. The general plan aims to require a hazardous march across an open field, in which those within the line of fortifications may at an advantageous time send forth detachments to make counter charges. Among the field fortification works are the *redan*, which forms an angle in front of the enemy. It has two parapets protected by a ditch; the redoubt, an inclosure with a parapet and ditch encircling it; and the lunette, a redan construction with numerous short flanks. These works are so constructed that they flank each other within the range of rifle fire, and are further strengthened by entrenched camps and by a series of rectangular or square redoubts. In case the time to construct is limited, such simple entrenchments as shelter trenches are speedily thrown up. These temporary forms consist of earth thrown toward the front, back of it being a ditch in which the rifleman lies securely protected from the fire of lighter implements. An abatis of felled trees and barbed wire fences is effective in impeding the advance of the enemy. Barbed wire has been used extensively for this purpose within recent years.

The fortifications of seaports are quite different from those constructed for the defense of interior positions. Heavy ordnance which throw dynamite shells and other powerful explosives a distance of six or eight miles have made it necessary to greatly revolutionize defensive warfare. The largest guns obtainable are securely mounted, and by means of them the enemy's ships can be reached by the most powerful explosives and leaden balls. For additional protection the enemy's ships are watched with the aid of powerful electric lights and swift steamers are utilized to scout. In many instances torpedoes plow under the water, by which it is aimed to strike the enemy's ships from below. The outer defensive works consist of submarine mines, which are set off by the enemy's ships, or by means of electric connection from the shore.

Permanent fortifications are constructed of massive stone and iron works and are designed to defend important cities or strategic points. It is doubtful whether any fortress can be built that would form a serious obstacle to a modern land and naval attack, if the assailants were supplied with the most powerful modern guns. The greatest fortress in the world is the celebrated stronghold of Gibraltar, on the coast of Spain. It is considered impregnable to military assault, though this is due to its natural situation rather than to its artificial strength. Since modern guns have been able to obliterate practically all the older forms of fortresses, the newer are designed for offensive action rather than great strongholds of defense. They are constructed on the spherical plan, supplied with guns of the heavier caliber, and designed for special effect against ricochet firing. Places permanently fortified are inclosed by *ramparts;* the upper surface, called the *terreplein*, serves as the location of troops and cannon. *Parapets* or *breastworks* protect the terreplein against the fire of the enemy, while *embrasures*, through which the guns are fired, pierce the parapets at convenient intervals. *Ditches* about twelve feet in depth are excavated outside the rampart, often filled with water, and rendered serviceable in delaying the enemy's advance, along with wire fences and by other obstructions. The United States has permanent seacoast defenses at about forty localities. They include

Hampton Roads, Va., Boston, Mass., New York, N. Y., Washington, D. C., Charleston, S. C., Key West, Fla., New Orleans, La., Galveston, Tex., San Francisco, Cal., and the mouth of the Columbia River, Ore. and Wash. Many cities and seaports of Canada are protected by fortifications, of which those at Quebec, Quebec, Esquimault, British Columbia, and Halifax, New Brunswick, are the most noteworthy. Indeed, Halifax is the chief naval station of the British in North America. It is defended by eleven forts and batteries, one of which, the Citadel, is counted, next to Quebec, the strongest fortification in America.

FORT MADISON (măd'ĭ-s'n), a city in Iowa, county seat of Lee County, on the Mississippi River, eighteen miles southwest of Burlington. It is on the Chicago, Burlington and Quincy and the Atchison, Topeka and Santa Fé railroads. Among the chief buildings are the county courthouse, the State penitentiary, the Catermole Memorial Library, and the high school. The manufactures include furniture, machinery, woodenware, flour, boots and shoes, paper, and leather. It has electric lighting and other public utilities. The city has an important trade in farm produce and merchandise. It was settled in 1832 and incorporated in 1836. Population, 1910, 8,900.

FORT MIMS, Massacre of, an assault during the Creek War, Aug. 30, 1813, at Fort Mims, about 35 miles north of Mobile, Ala. The fort was a temporary stockade under command of Dixon Bailey and about 550 persons had assembled there for protection. Weathersford, a half-breed, made an attack with a force of Indians. The fort made a vigorous defense, but was overpowered by superior numbers, and only fifteen escaped, all the others being massacred.

FORT MONROE (mŭn-rō'), or **Fortress Monroe,** the strongest fortification in the United States, situated on Hampton Roads, Virginia. It was erected for the defense of the Norfolk navy yard, on the coast of Virginia, and occupies a fine site at Old Point Comfort. The plans and construction were completed under a French engineer. It is on a reservation of 282 acres and has within it detached buildings for workshops, barracks, officers' quarters, storehouses, and an artillery school. Many tourists visit the place, owing to its fine climate and extensive hotel, railway, and steamboat connections. In the Civil War it was an important Confederate stronghold. Jefferson Davis was imprisoned for two years at Fort Monroe after the war closed.

FORT MOULTRIE (mōl'trĭ), a fortification situated on Sullivan's Island, near the entrance to Charleston harbor, South Carolina. The fort was originally constructed of earth and logs, but was afterward rebuilt in masonry. A British fleet made an unsuccessful attack upon it in 1776. It was then known as Fort Sullivan and was defended by 6,500 Americans, of whom 435 were stationed at the fort. The British fleet under Sir Peter Parker and a force of regulars under Sir Henry Clinton made a combined attack, but they were compelled to abandon the invasion of the South. However, it surrendered to the British on May 7, 1780. The name was changed during the Revolutionary War to Fort Moultrie in honor of Col. William Moultrie, who defended it at the beginning of the war. In December, 1860, it was abandoned by Major Anderson, when it fell into the possession of the Confederate forces.

FORT NIAGARA (nī-ăg'ă-rà), a fort near the mouth of the Niagara River, on the American side, located by La Salle as a fortified trading post in 1669. This was afterward destroyed and abandoned and Fort Niagara was built on the same place by the French in 1725. The English under Sir William Johnson captured it during the French and Indian War, in 1759, hence the French were cut off from all their posts in the interior. During the American Revolution it was a center of British influence, whence many expeditions were sent to points farther south. It was evacuated by the British in 1796 as provided in the Treaty of 1783 and became the seat of an American garrison. In 1813 it was captured by the British, who crossed over from Canada and made a night attack upon the fort, but in 1815 it was again surrendered to the United States. It ceased to be a fort in 1826, when the Federal garrison was withdrawn.

FORT PICKENS (pĭk'ĕnz), a fort in Florida, on Santa Rosa Island, at the entrance of Pensacola Harbor. A Federal force under Adam J. Slemmer was in possession of the fort at the beginning of the Civil War, and was besieged by the Confederates under Braxton Bragg. In April, 1861, reënforcements were sent to relieve the fort and it was held by the Federals throughout the war. Fort Pickens is a defense to the United States navy yard at Warrington.

FORT PILLOW, a fort on the Mississippi River, in Tennessee, forty miles north of Memphis. It was so named from General Pillow, under whose direction it was constructed by the Confederates in 1862, but a small Federal force captured it soon after. General Forrest made an attack upon it April 12, 1864, and the garrison was reduced after stubborn resistance. It was asserted that many of the Federals, about half of whom were Negroes, were massacred after they had surrendered, but this charge was denied by the Confederates on the ground that the garrison conducted a reckless defense, hence many of the soldiers were killed after resistance was futile.

FORT SCOTT, a city in Kansas, county seat of Bourbon County, on the Marmaton River, 98 miles south of Kansas City. It is on the

Missouri Pacific, the Missouri, Kansas and Texas, and other railroads. The surrounding country is fertile and contains valuable deposits of cement rock, flagstone, and bituminous coal. A system of street lighting, electric railways, a public park, and a city library are among the facilities. The public buildings include a United States courthouse and post office, a high school, an academy for girls, and a normal college. The manufactures include woolen goods, beet sugar, cigars, clothing, flour, machinery, soap, vehicles, and sorghum. It was settled in 1838 and incorporated as a city of the first class in 1886. Population, 1904, 14,081; in 1910, 10,463.

FORT SMITH, a city in Arkansas, county seat of Sebastian County, on the Arkansas and Poteau rivers, 130 miles northwest of Little Rock. It is on the Kansas City Southern, the Saint Louis and San Francisco, and other railroads. The chief buildings include the county courthouse, the United States customhouse, the high school, and the public library. It is the seat of a United States district court. The manufactures include cotton seed oil, cigars, furniture, ice, cotton goods, and machinery. Electric lights, rapid transit, pavements, and waterworks are among the improvements. It was settled in 1838, incorporated as a town in 1842, and chartered as a city in 1886. Population, 1900, 11,587; in 1910, 23,975.

FORT STANWIX (stăn'wĭks), a fort built by the English under Brigadier Stanwix in 1758, on the site occupied by Rome, N. Y. It was an important strategic point, owing to its location on the principle route between Canada and points in the State of New York. In 1768 Sir William Johnson made a treaty at this place with the Six Nations, who surrendered title to a large part of the region now included in West Virginia, Kentucky, and Pennsylvania. It was rebuilt in 1776 and named Fort Schuyler. The following year it was attacked by a British force under Saint Leger, who had advanced from Canada. See **Oriskany, Battle of.**

FORT SUMTER (sŭm'tẽr), a fortification situated at the entrance to Charleston harbor, South Carolina, and named after Thomas Sumter, an American leader in the Revolutionary War. South Carolina seceded in December, 1860, and Major Anderson, the commanding officer, abandoned the adjacent forts and occupied Fort Sumter with 100 men and 52 light guns. General Beauregard led an attack on the fort April 12, 1861, and two days later it was compelled to surrender. This event was the beginning of the Civil War, and the news of it immediately spread the fire of enthusiasm over the entire North and brought that section to arms. The Confederates held the fort until after the evacuation of Charleston, but surrendered it on April 14, 1865, four years after its capture. Soon after the loss of Fort Sumter to the Confederates, Richmond was evacuated, the Confederate forces surrendered, and their cause was entirely abandoned. Since the Civil War it has been rebuilt and greatly improved.

FORTUNA (fôr-tū'nȧ), the Roman goddess of chance, called Tyche by the Greeks. She personified the combination of circumstances which we call luck or fortune. It was supposed that she smiled at the birth of the successful, and frowned on those whose efforts resulted in failure. Temples were built to her at Corinth, Smyrna, and Elis, and statues were erected at Antium. In her temple at Thebes she is represented holding the infant Plutus in her arms to symbolize her power over riches and prosperity. According to a Roman legend, she put off her wings and shoes, and threw away her rudder when entering the capital, as an indication that she meant to dwell in the Eternal City forever.

FORTUNY Y CARBO (fôr-tōō'nē ē kär-bō'), **Mariano,** famous painter, born in Reus, Catalonia, Spain, June 11, 1838; died in Rome, Nov. 21, 1874. His careful work at the Academy of Barcelona secured a prize and permitted him to pursue further study in Rome in 1858. Besides his extensive and valuable paintings in oil, he produced numerous productions in etching and in water colors. Among his best known pictures are "Amateur of Prints," "Book Lovers in the Library of Richelieu," "The Sword Sharpener," "Fantasia Morocco," and "A Spanish Marriage." The last named painting was suggested by the occasion of his wedding.

FORT WILLIAM, a city of Thunder Bay District, Ontario, on the Kaministiquia River, near Lake Superior, and on the Canadian Pacific, Canadian Northern, and Grand Trunk Pacific railroads. It has grain elevators, gas and electric plants, brick yards, railroad shops, stove works, and wood working factories. The wholesale trade is extensive. Among the features are the city hall, courthouse, Y. M. C. A., high school, public library, and many fine churches. It was founded in 1801 by the Hudson Bay Company. Population, 1911, 16,499.

FORT WAYNE (wān), a city of Indiana, county seat of Allen County, on the Maumee River and the Wabash and Erie Canal, about 150 miles southeast of Chicago, Ill. It is on the Wabash, the Pennsylvania, the Lake Erie and Western, the Lake Shore and Michigan Southern, the Grand Rapids and Indiana, and other railroads, and is the converging center of several electric interurban railways. Among the noteworthy buildings are the county courthouse, the Carnegie public library, the Federal building, the Concordia College (Lutheran), the Indiana School for Feeble-Minded Youth, and a Roman Catholic academy. The architecture is modern and substantial, including many tall office, bank, and hotel buildings. It is surrounded by a productive farming

country and has a large wholesale and jobbing trade. Among the chief manufactures are agricultural implements, furniture, steam engines, car wheels, electrical apparatus, leather, stoves, woolen goods, and hardware. It has extensive systems of sewerage, stone and macadam paving, waterworks, and gas and electric lighting. Fort Wayne was so named from Gen. Anthony Wayne, who built a fort here in 1794, and a monument has been erected to his honor. It was chartered as a city in 1839 and became prosperous in 1840, after the completion of the Wabash and Erie Canal. Population, 1900, 45,115; in 1910, 63,933.

FORT WORTH, a city of Texas, county seat of Tarrant County, at the junction of the Trinity, Clear, and West rivers, about 170 miles north of Austin. It is on the Fort Worth and Denver, the Texas and Pacific, the Chicago, Rock Island and Pacific, the Gulf, Colorado and Santa Fé, and other railroads, and is connected with Dallas, thirty miles east, by an electric railway. The Clear River and numerous artesian wells furnish an ample supply of water for manufacturing and sanitary purposes. An extensive street railway system penetrates all parts of the city, while electric lighting, waterworks, public libraries, and an excellent school system are among the general facilities. It is the seat of the Natatorium, a bathing establishment costing $50,000. Among the educational institutions are the Fort Worth University, the Polytechnic College, the Fort Worth Medical College, and a Roman Catholic academy. The city hall, courthouse, high school, and chamber of commerce building are convenient and costly edifices. It has manufactures of wire, flour, hardware, jute, clothing, cotton and woolen goods, leather, and machinery. Fort Worth has a large trade in farm produce, live stock, and merchandise. It was settled in 1849 and incorporated in 1872. Population, 1900, 26,688; in 1910, 73,312.

FORUM (fō'rŭm), in Roman history, a public place or square in a city where markets and public assemblies were held and where justice was administered. The most noted in Rome was the Forum Romanum, situated between Mount Palatine and the Capitoline Hill, which was adorned with exquisite statuary and magnificent buildings, and beautified by foliage, flowers, and walks. The government of Italy has recently made excavations and is preserving the more valuable relics for study. Legally, the term *forum* implies a court where an action may be instituted.

FOSSILS (fŏs'sĭls), the organic bodies that were buried in past ages by deposits of earth, and which preserved their form or substance so as to be capable of identification. The term is also applied to indentations made by animals on rocks while forming, as the imprints of birds walking on pasty deposits. Some fossils consist of vegetable and animal parts in a good state of preservation, as the trunks of trees or the bones, teeth, and horns of animals, and the shells of mollusks. The process of fossilization is due to the decomposition of the least permanent in the organic structure and its replacement with some mineral matter. In some cases new material is substituted for the entire decomposed mass, while in others the organic remains are preserved in an almost perfect state. Shells, wood, and other substances are frequently changed into various siliceous fossils by subjecting the organism to the action of water containing silica in solution. Similar results take place when the mineral matter is iron oxide, pyrite, or calcium carbonate, while in rare cases barite and flourite have a like effect. When the organic portions pass away in decay, the mineral matters slowly take their place.

Fossil footprints of extinct animals have been discovered in the Triassic and Carboniferous rocks of Eurasia and in the Cambrian, Silurian, and Carboniferous of America. The imprints are largely those of birds, reptiles, mollusks, fish, and insects, and were made either by the feet in walking or by the body in making impressions in the mud after death. Fossil botany now includes many extinct plants, among them those of the Dakota group of cretaceous deposits, found in America; those of the Fayette formation, and those of the Florissant, found in Colorado, each of these including a large number of species. Among the recent publications on this subject are F. H. Knowlton's "Catalogue of Cretaceous and Tertiary Plants of North America" and A. C. Seward's "Fossil Plants for Students of Botany and Geology."

FOSTER (fŏs'tẽr), **Charles,** statesman, born at Tiffin, Ohio, April 12, 1828; died Jan. 9, 1904. After securing an education, he engaged as a merchant and banker in Fostoria, Ohio. He was elected to Congress as a Republican in 1870, and subsequently was reëlected three times. While on the Ways and Means Committee, he secured a thorough investigation of the Sanborn frauds and induced the repeal of the Moiety law. In 1874 he investigated certain electoral frauds at New Orleans, and in his official report denounced the acts of both political parties in Louisiana. In 1880-84 he was Governor of Ohio, and in the administration of President Harrison was Secretary of the Treasury, beginning in 1891.

FOSTER, George Eulas, statesman, born in Carleton, New Brunswick, Sept. 3, 1847. He attended the schools in his native town, graduated in the University of New Brunswick in 1868, and for three years taught school at Fredericton. Subsequently he studied at Edinburgh and Heidelberg, and in 1871 was made professor of classics and history in the University of New Brunswick, in which he taught successfully until 1879. He became a member

of the Canadian House of Commons in 1882, was made Minister of Marine in 1885, and in 1888 was chosen Minister of Finance in the Cabinet. As a scholar and statesman he exercised a wide influence, and in the Bering Sea fisheries dispute he did much toward furthering the interests of Canada. He published a number of pamphlets relating to temperance and political questions.

FOSTER, John Watson, statesman, born in Pike County, Indiana, March 2, 1836. He graduated from the State University of Indiana in 1855, studied law at Harvard, and entered upon the practice of law in Evansville, Ind. Soon after the beginning of the Civil War he entered the service as major. President Grant appointed him minister to Mexico in 1873, and in 1880 he was made minister to Russia. Later he served as minister to Spain. In 1892 he succeeded J. G. Blaine as Secretary of State, represented the United States at Geneva in the Bering Sea arbitration in 1893, and in 1895, was selected by the Emperor of China to treat with Japan as peace commissioner. He negotiated a treaty with much ability, which was promptly ratified as the Treaty of Shimonoseki. In 1898 he was appointed a member of the Anglo-American joint high commission, which was created that year. He published "A Century of American Diplomacy." He died Nov. 15, 1917.

FOSTER, Murphy James, public man, born at Franklin, La., Jan. 12, 1849. He studied at Washington and Lee University, graduated at Cumberland University in 1870, and subsequently studied law at Tulane University. For some years he practiced his profession in his native town. In 1880-92 he was a member of the State Senate and was prominent as an opponent of the Louisiana State Lottery. He was Governor of the State in 1892-1900. In the latter year he was elected to the United States Senate and was reëlected in 1906.

FOSTER, Randolph Sinks, Methodist Episcopal bishop, born in Williamsburg, Ohio, Feb. 22, 1820; died May 1, 1903. He was educated at Augusta College, Kentucky, becoming a minister in 1837, and secured a charge in the Kentucky conference. Subsequently he labored in Ohio and New York, and from 1857 until 1860 was president of the Northwestern University in Evanston, Ill. Later he served as pastor in New York and Sing Sing and became bishop in 1872, making visitations in Europe and several of the South American republics. His publications include "Christian Purity," "Beyond the Grave," "Study in Theology," "Minister for the Times," and "Centenary Thoughts for the Public and Pew of Methodism."

FOSTER, Stephen Collins, song and ballad writer, born in Pittsburg, Pa., July 4, 1826; died at New York, Jan. 13, 1864. He was related by marriage to President Buchanan, possessed a fair knowledge of German and French, and began writing songs at the age of thirteen. He composed 125 popular songs, a large portion being melodies in the Negro dialect. Among the best known are "Sadly to Mine Heart," "Nellie Was a Lady," "Come Where My Love Lies Dreaming," "Old Dog Tray," "Massa's in the Cold, Cold Ground," "Old Kentucky Home," and "Old Folks at Home." His songs became popular from the first and were a source of profit to him, his "Old Folks at Home" bringing him about $15,000.

FOSTORIA (fŏs-tō′rĭ-ȧ), a city of Ohio, in Seneca County, about twelve miles west of Tiffin. It is on the Lake Erie and Western, the Baltimore and Ohio, and other railroads, and has a large trade in produce and merchandise. The surrounding country is fertile, producing cereals and fruit, and gas and oil fields are worked in the vicinity. Among the noteworthy buildings are the high school, the city hall, and the Ohio Normal University. The manufactures include flour, cigars, machinery, glass, and utensils. Gas and electric lights, street railways, waterworks, and fine school buildings are among the improvements. Fostoria was named from the father of Charles Foster, who was Governor of Ohio. The present charter dates from 1889. Population, 1900, 7,730; in 1910, 9,597.

FOUCAULT (fōō-kō′), **Jean Bernard Léon,** physicist, born in Paris, France, Sept. 18, 1819; died Feb. 11, 1868. He studied medicine in his native city, but gave his attention chiefly to physical research. In 1844 he invented an apparatus used in making optical experiments by means of electric light. Soon after he demonstrated the rotation of the earth on its axis by the pendulum and gyroscope. In 1854 he was made physicist in the Imperial Observatory, and his method of measuring the velocity of light secured for him the Copley medal. He is the inventor of the Foucault polarizing prism.

FOUCHÉ (fōō-shȧ′), **Joseph,** Duke of Otranto, minister of police under Napoleon I., born near Nantes, France, May 29, 1763; died in Trieste, Austria, Dec. 25, 1820. He was educated in Paris, lectured in the colleges of Juilly, Arras, and Vendôme, and subsequently became an advocate. In 1792 he succeeded in an election to the national convention. He advocated the execution of Louis XVI., was nominally implicated in the atrocities of the period, and was expelled from the national convention in 1794. Later he became ambassador to Milan and then to Holland, but shortly after was recalled to Paris and appointed minister of police. Napoleon dismissed him twice on account of mistrust, but each time renamed him for the place. When the titles of nobility were revived, he was made Duke of Otranto. After the fall of Napoleon, he was given office by Louis XVIII., but was soon after dismissed

and banished with all those who had voted for the death of Louis XVI. Subsequently he settled at Prague, where he became a citizen of Austria.

FOULKE, William Dudley, lawyer and author, born in New York City, Nov. 20, 1848. He studied at Columbia University, was admitted to the bar in 1871, and began a successful practice in New York City. In 1876 he removed to Richmond, Ind., where he was a railroad attorney, and in 1888 edited the *Palladium.* From 1882 until 1886 he was a member of the State Senate of Indiana, where he was influential as a civil-service reformer. His publications include "Civil-Service Reform, its Labor Aspects," "Proportional Representation," "The Silver Question," "The Theory and the Practice of Civil-Service Reform," and "A Study of the Growth and Tendencies of Russian Civilization."

FOUNDRY (found'rў), an establishment which is supplied with the necessary machinery to melt and mold cast iron and other metals on a large scale. Foundries are usually located near the blast furnaces, or have such furnaces within the main or adjacent buildings, and from these the products of pig iron are obtained for the second fusion, which is the special object of the foundry. The process of shaping metallic figures is done by pouring the molten materials into molds in which it cools and solidifies. This operation is called *founding* or *casting* (q. v.). The mold used is usually in two parts, one containing the pattern, which is surrounded by a fine molding sand, and the other part is tightly fitted to it. When the pattern is completely packed, it is removed carefully, leaving the sand so it forms a perfect mold for the object to be cast. The molten metal is poured into ladles, by which it is transmitted into the mold through small holes made through the sand. Much care is required in founding complicated parts of machinery. The manufacture of stoves, hollow ware, and various castings for machinery comprise the more important products of foundries. See **Casting; Furnace.**

FOUNDLING HOSPITAL, an institution for the reception and support of deserted children. Two classes are maintained, those supported by the government and those depending for support on private or sectarian aid. Abandoned children are known as *foundlings,* and the cause of their desertion is in most cases illegitimate birth, though quite a number are abandoned as a result of poverty or unhappy wedlock. Formerly the county poor farm was the only place provided for foundlings, but more recently better provisions have been made, especially in the larger cities, where foundling hospitals are very essential. The death rate in these institutions on an average is about 75 per cent., though it is frequently much higher. This is due to the circumstance that children received there are not in a good state of health, or are weakened by the anxiety and poverty of the mother. Children receive careful medical treatment and those that survive are usually placed in homes. The first foundling hospital was established in Milan, Italy, in 787. Soon after they became common in many cities of Europe. At present private or public institutions of this kind are maintained in many of the great cities of the United States and in some of the cities of Canada.

FOUNTAIN (foun'tĭn), an artificial basin containing water for drinking or other useful purposes, and connected by an arrangement of pipes through which water is forced to specific heights in ornamental jets. The pressure of the water at the head of the pipes is sufficient to cause it to rise to almost the same height at the orifice of issue. Many of the larger cities maintain elaborate fountains in public parks and squares for refreshing and ornamental purposes, while very beautiful effects are seen in connection with them at the great expositions. Among the most noted fountains are those at Rome, Berlin, and Paris. Those in Paris are mostly at the Place de la Concorde and at the Tuileries. The fountains seen at the international expositions are beautifully illuminated by electric lights, by means of which it is possible to secure elaborate color effects at night. Fine examples of these were furnished in the *Fountain of the Republic,* at Chicago in 1893; the fountains of *Man, Nature,* and *Progress,* at Buffalo in 1901; and the *Cascades,* at Saint Louis in 1904.

FOUNTAIN OF YOUTH. See **Ponce de Leon.**

FOUQUÉ (fōō-kā'), **Freiderich Heinrich Karl,** poet and novelist, born at Brandenburg, Germany, Feb. 12, 1777; died Jan. 23, 1843. His father, a major general in the Prussian army, trained him for a military life. In 1792 he entered the army and served continuously until 1813, when he retired with the rank of major. He lectured on poetry and history a number of years. His "Sigurd the Snake-Killer" is a fantastic and humorous story. Other writings include "Seasons of the Year," "Dramatical Works," "Spiritual Poems," and "The Magic Ring."

FOUQUET (fōō-kā'), **Nicolas,** statesman, born in Paris, France, Jan. 27, 1615; died Mar. 23, 1680. He descended from a noble family, was educated for the civil service, and held many important offices in Paris and under the government. In 1653 he became superintendent of finance, and succeeded in placing the government on a more stable financial basis. However, he incurred the disfavor of Colbert, who influenced the king against Fouquet, and he was subsequently arrested on a charge of malfeasance in office. He was adjudged guilty and consigned to the Bastile and was afterward condemned to banishment, but the sentence

was changed to life imprisonment. During his captivity, about fifteen years, he wrote a number of devotional works. He died while in prison at the fortress of Pignerol.

FOUR CORNERS, a locality in Elgin County, Ontario. General Proctor was stationed at this place with a British force and was attacked by the Americans under General Harrison on Oct. 1, 1813, a short time before the Battle of the Thames. The Americans were repulsed at Four Corners.

FOURIER (fōō-ryā'), **François Marie Charles,** socialist and founder of Fourierism, born in Besançon, France, April 7, 1772; died in Paris, Oct. 10, 1837. He studied at the place of his birth and later at Rouen and Lyons, where he showed aptitude in music and the sciences. On leaving school he became clerk in a mercantile house. Subsequently he entered business on his own account, but lost his money by reason of military disturbances and an insurrection in Lyons. During his leisure he wrote numerous books on social questions and founded the Fourier socialistic system. According to this system, harmony can be brought out of social discord by giving free play to all the feelings and passions of life. It designs to colonize mankind in *phalanges,* each one a body of about 1,800 persons, divided according to affinities into groups of 24 to 32, constituted of persons attracted by one of the four affecting passions—*ambition, friendship, love,* and *familism.* Each of these groups should occupy a *phalanstére,* a highly cultivated self-supporting tract a league square. The members are to have their support from the result of the labors of all, and the residue is to be divided in twelve shares, three to be given as a reward for talent, four to capitalists, and five as a reward for labor. The system was tried in the United States and France and in both instances resulted in failure.

FOUR-O'CLOCK (fōr'ŏ-klŏk), an ornamental flowering plant native to Peru, but naturalized extensively in all the continents. It is so called because it blooms from about four o'clock in the afternoon until the next morning. Many varieties of colors have been obtained by cultivation. Most species are cultivated extensively in flowering beds and gardens. The calyx is often mistaken for a corolla, from its brilliance and calyxlike involucre.

FOWL, a term formerly used as a synonym of bird, but now restricted more particularly to the genus of birds known as *Gallus,* of which the East India jungle fowl is thought to be the original. The domestic fowl, including the cock and hen, belong to this class. That the domestication of fowls is of great antiquity is attested by figures on Egyptian monuments and the traditions of the Chinese, according to which they received their poultry from western countries as early as 1400 B. C. Among the best known species are the Leghorn, Spanish, Hamburg, Cochin, Brahma, Bantam, Plymouth Rock, Langshan, and Dorking. See **Poultry.**

FOWLER (fou'lĕr), **Charles Henry,** clergyman, born in Burford, Canada, Aug. 11, 1837; died March 20, 1908. He removed with his parents to the United States in 1840 and graduated at Genesee College, New York, in 1859. Subsequently he attended the Garrett Biblical Institute, Evanston, Ill., and after graduating accepted an appointment as minister of the Methodist Episcopal Church in Chicago. In 1872 he was chosen president of the Northwestern University and, after serving efficiently for four years, he became editor of the *Christian Advocate,* the leading Methodist periodical in America. He was elected bishop in 1884, traveled in South America the following year as missionary, and in 1888 made a tour of visitation around the world. He founded a number of important institutions, among them the Nankin Wesleyan University in Central China. Besides lecturing and writing extensively, he published "Colenso's Fallacies."

FOX, an animal which is allied to the dog, having a long, bushy tail and erect ears. The pupil of the eyes is vertically elliptical. In all species the skull is rounded, the nose is very pointed, and the limbs are slender. However, they differ in size, color, and weight, but all exhibit the same artifices in obtaining prey and escaping danger. Foxes are so cunning that they are not easily caught in a trap. They burrow in the ground and live on animal food, unless pressed with hunger, when they feed on vegetable substances, especially seeds. Among the best known American species are the red, gray, cross, and Arctic foxes, which are hunted and trapped for their furs. The Arctic fox is smaller than the common fox, is pure white in winter, and abounds in the far north of the continent. It is gregarious and much more easily tamed than other species. Several species of the fox are found in Eurasia and Africa, though those common to the high latitudes are almost universally smaller in stature than those which frequent the warmer countries.

The cunning of the fox has caused it to enter largely as a popular figure into stories and fables. Some of these stories, especially those relating to its skill in getting food and in evading its enemies, are so remarkable that they are not universally believed. It is thought that this cunning developed as the result of the inherited experience of many generations. The cry is a yelping bark, but older ones learn to imitate the voice of other animals and use this means to decoy their prey. Some species live out in the woods, but most of them burrow in the ground, or select a deserted nest of a rabbit or a badger. The home of a fox usually consists of several rooms or compartments, such as an outer room or hole, a supply room, and an apartment for sleeping. The male gen-

erally occupies the outer room, while the female and the young are back in the part which is best protected from intruders. In most cases the litter consists of from four to six, brought forth in April. During the day the fox remains in hiding, but it comes out at night and moves about rapidly, often committing havoc among the poultry. The fox chase is looked upon as a favorite sport in England, where this animal is protected by law, except at a specified period, when it is pursued with dogs and horses which are trained especially for this purpose. The sport consists of seeing the cunning methods by which the animal seeks to avoid capture. It will often feign death and endure rough treatment, seeking thereby to make good its escape.



HOME OF THE FOX.

FOX, the name of two rivers that rise in Wisconsin, though both are also known by other appellations. The Fox, or Pishtaka, has its source in Waukesha county, flows in a southerly direction and joins the Illinois River at Ottawa, Illinois. The Fox, or Neenah, rises in Green Lake county, makes a bold turn toward the west and north, after a tortuous course passes into Lake Winnebago, and thence flows northeast into Green Bay. Its entire course is about 250 miles. Near its headwater it approaches within two miles of the Wisconsin River, with which it is connected by a canal at Portage City, thus providing a union between Lake Michigan and the Mississippi River.

FOX, Charles James, noted statesman, born in London, England, Jan. 24, 1749; died Sept. 13, 1806. He was the second son of Henry, first Lord Holland, educated at Eton and Oxford, and elected to Parliament for Westminster at the age of nineteen. In his legislative policy he supported Lord North and became admiralty lord, and in 1782 obtained the office of Secretary of State for Foreign Affairs. In the rivalry between Burke and Pitt he sided with the former, and opposed the British coercive policy in dealing with the American colonies prior to and during the Revolution. His career as a statesman was distinguished by brilliant oratory and marked regard for the interest of colonial possessions. He ranked as a speaker with Burke, Sheridan, and Pitt. His remains were buried in Westminster Abbey.

FOX, George, founder of the society of Friends, born at Drayton, Leicestershire, England, in July, 1624; died Jan. 13, 1691. His religious work began at the age of nineteen, when he took the Bible for his creed and traveled throughout many portions of Britain, holding meetings and preaching the gospel. Besides opposing all superfluous religious ceremony, he refused to remove his hat for any one, and addressed both men and women by using the pronouns thee and thou. While the sincerity of his teaching was admitted, he was persecuted and placed under arrest at various times. In 1677 he accompanied Penn and Barclay to Germany and Holland, and also visited the American continent. From the trembling mode of delivery in preaching and the frequency with which he admonished the rulers to call upon the Lord in fear and trembling, his followers became known as *Quakers,* the term being first applied at Derby, England. He wrote numerous works relating to his doctrines.

FOX BAT, the general name of any large bat, or flying fox, which is characterized by its habit of eating fruit. Seventy species have been catalogued, all of which are native to Asia, Africa, and the Malay Archipelago. The species are mostly large and tailless. They have large eyes and pointed teeth, and have the color of the red fox. They do much dam-

age to mango and cocoanut plantations. In habit they are nocturnal, coming out at night in search of food. Their flesh is eaten by the natives.

FOXGLOVE, the common name of a genus of plants known as *Digitalis,* which includes a number of species that are native to Europe and Asia. The common foxgloves have erect stems with numerous large leaves at their bases. At the upper end of the stems are racemes of variously colored flowers. Several of the species have been greatly improved by cultivation and are grown as flowering plants in gardens and parks. They thrive best in light, rich soil. The drug known as *digitalis,* which is obtained from a species of foxglove, is a bitter substance and has sedative and narcotic properties.

FOXHOUND (fŏx'hound), one of several breeds of dogs which are of value in fox hunting. It is noted for its fleetness, perseverance, physical strength, and fine scent. Its average height is 21 inches. The foxhound is supposed to be a cross between the staghound and the bloodhound.

FOX INDIANS, a tribe of North American Indians belonging to the Algonquin family. Formerly it occupied portions of Iowa, Nebraska, and Kansas, but now only few remnants remain in these states and in Oklahoma. Many of these Indians are industrious and progressive, having acquired both educational advancement and financial stability. See **Sacs and Foxes.**

FOX SPARROW (spăr'rō), a handsome species of sparrow native to Canada and the United States. It has a rusty red plumage, but the breast is whitish. The eggs are thickly spotted and are laid in thickets or in tufts of grass. The song is loud and cheerful, resembling that of a thrush. It is migratory, passing far into the north of Canada to breed.

FOXTAIL GRASS, the name applied to several grasses with brush-like spikes which resemble the tail of a fox. Several species abound in meadows and pastures. They possess nutritive qualities, though some, from their hardy nature and remarkable tendency to multiply, are obnoxious weeds in cultivated lands. A number of species are naturalized in North America and are cultivated as forage plants.

FOX TERRIER (tĕr'rĭ-ĕr), a small dog which is useful in following the fox to its habitation. The weight is about eighteen pounds. Its spirit is keen and lively, and it is adapted in every way for companionship and service in the hunt.

FOYLE (foil), a river in Ireland, formed by the junction of the Finn and Mourne. It forms the boundary between Donegal and Londonderry counties and flows into Lough Foyle, an inlet on the northern coast of Ireland, four miles below the city of Londonderry. The entire length is about seventy miles. It is famous for its salmon fisheries.

FRACTION (frăk'shŭn), in algebra and arithmetic, an expression of one or more of the equal parts of a divided whole, or an expression for an unexecuted division, originally invented to represent a quantity less than a unit. The dividend number is called the *numerator,* because it numbers how many parts are taken, and the divisor is called the *denominator,* because it names the parts, thus, in the fraction ¾, 3 is the numerator and 4 is the denominator. A fraction is said to be *proper* when the denominator is greater than the numerator, and *improper,* when the numerator is greater than the denominator. In the former case the value is less and in the latter more than 1. If both terms of the fraction are equal, it represents 1, or unity. A decimal fraction is one whose denominator is 1 with zeros annexed, in which the denominator is not written, but is understood from a point being prefixed, with zeros if necessary; thus, .086 for $\frac{86}{1000}$. All the fundamental operations in arithmetic, that is, addition, subtraction, multiplication, and division, may be performed in fractions, but the denomination must be the same. In decimal fractions the denomination depends upon the position of the decimal point, as .1, .01, .001. Common fractions are reduced to a *common denominator* by multiplying both terms of each fraction by the denominator of the other fractions.

FRA DIAVOLO (frä dē-ä'vō-lō), celebrated brigand, born at Calabria, Italy, in 1760; executed in 1806. His name was Michele Pezza, but was changed to Fra Diavolo, signifying "brother devil." His training and education was that of a monk, but he became the leader of a band of robbers in the mountains of Calabria. In 1799 he joined the forces of Ferdinand of Naples against France and was raised to the rank of a colonel. Later he tried to organize an insurrection in Calabria, but was captured and hanged as a robber. Auber's "Fra Diavolo" is based upon the experiences of Michele Pezza.

FRAMINGHAM (frā'mĭng-hăm), a town of Massachusetts, in Middlesex County, on the Sudbury River, twenty miles west of Boston. It is on the Boston and Albany and the New York, New Haven and Hartford railroads. Among the chief buildings are a State normal school, a hospital, a public library, and a home for the aged. The manufactures include chairs, woolen cloth, rubber goods, and boots and shoes. The first settlement, made about 1647, was known as Danforth's Plantation. It was incorporated in 1700. Population, 1910, 12,948.

FRANC (frăŋk), a silver coin of France, divided into ten decimes and 100 centimes. It was first coined in 1795 and was adopted by Belgium in 1833 and by Switzerland in 1849. It corresponds in coinage to the cent of Canada

and the United States, in that it is issued in different denominations, such as 1, 2, and 5 franc pieces. The value of a franc is about 9½ pence in English money and a little over 19 cents in the money of Canada and the United States.

FRANCE (frâns), a republic of Western Europe, located between latitude 42° 20′ and 51° 5′ north and longitude 4° 48′ west and 7° 31′ east from Greenwich. It is bounded on the north by the English Channel, the Strait of Dover, and the North Sea; east by Belgium, Germany, Switzerland, and Italy; south by the Mediterranean Sea and Spain; and west by the Atlantic Ocean and the English Channel. Its greatest breadth from east to west is 552 miles, and its length from north to south is 605 miles. In size it ranks fourth among the countries of Europe. The numerous coast indentations afford many good harbors, thus rendering the country capable of supporting an extensive maritime system. Numerous islands abound off the northwestern shore, the largest of which are Ré, Belle Isle, and Oléron. The total area is 207,107 square miles. This includes Corsica and a number of small islands, which have a surface of 3,700 square miles.

Description. The eastern portion of France is traversed by numerous mountain chains, of which the Pyrenees, Cévennes, and Vosges are the most prominent. These mountain ranges form the principal watershed, the rivers flowing from them to the west and north toward the Atlantic, and on the opposite side to the south and east into the Mediterranean. Vignemale, the highest peak of the Pyrenees in France, has an altitude of 10,792 feet. Mont Blanc, height 15,781 feet, is the culminating peak of the Alps, and is on the line between France and Italy, near Switzerland. The interior of France is marked by several volcanic groups known by the general name of Auvergne, while the coast region along the English Channel is largely level and exceedingly fertile. The Pyrenees separate France from Spain and have a general altitude of 9,000 feet. Passes for railroads are located at both ends of the range, near the coasts, but few highways cross these mountains. The Alps separate France from Switzerland and Italy, with celebrated passes and railway tunnels in the vicinity of Mont Cenis. The Jura Mountains are between France and Switzerland, and the Vosges extend from the western border into Germany. Corsica, where Monte Cinto has an elevation of 8,900 feet, belongs physically to Italy rather than France, and is united with it by a submarine plateau.

Many important river basins are formed by the foothills and mountains, through which flow numerous navigable streams. The entire number capable of navigation is about 200, and the total length of interior navigation aggregates 6,000 miles. Among the larger streams are the Rhone, the Loire, the Garonne, and the Seine. The largest of these is the Rhone, which passes from Switzerland through a gap between the Jura and the Alps into France, receives the Saône, another tributary, and flows southward into the Mediterranean by a delta. The Garonne rises in Spain, flows through a mountainous section in the upper course, and discharges into the Atlantic through the estuary of the Gironde. The Loire and Seine likewise discharge into the Atlantic. Other streams include the Isère, Durance, Dordogne, Mayenne, Eúre, Charente, and Sarthe. Lake Geneva is the most important inland water, but a portion of it lies in Switzerland. Bourget and Annecy are other lakes of the Rhone Basin, and aside from those mentioned there is none of considerable size. A number of lagoons are located along the coast.

Climate. As a whole the climate is favorable and among the most healthful in Europe. The isothermal lines of France indicate a normal temperature of about 50°. The regions in the southeast are the warmest and those in the northwest are the coldest, though all portions, except the most elevated mountain ranges, are susceptible to profitable cultivation, and are marked by atmospheric brightness and salubrity. At Paris the temperature averages 36° in January and 65° in July. The rainfall averages about thirty inches for the whole country, ranging from ten inches in the elevated northern plains to forty inches along the sea coast and in the Cévennes.

Flora and Fauna. France has a flora quite like that of the other countries in continental Europe, except in the more recently formed summits, where lichens and mosses abound. Forests of ash, oak, pine, and spruce characterize the regions of medium elevation, and the chestnut and mulberry are common to the less elevated sections in the south of France. Nutritious grasses are very common. Wild animal life is not abundant, owing to the country having been settled a long period of time. The chamois is found in the mountains, the mouflon is met in Corsica, and the fallow deer and wild boar are preserved in private estates and reservations. Many birds of song and plumage are common, and water fowls are numerous along the coasts. The fisheries yield many valuable catches, including oysters.

Mining. Valenciennes, in the northeastern part, is the center of productive coal fields, which are estimated at about 2,250 square miles. The deposits consist chiefly of a good grade of bituminous coal, valuable in manufacturing, but anthracite is found in the department of Isère and lignite coal occurs in the Pyrenees. Iron ore is obtained in considerable quantities, especially in the Jurassic rocks and in the Pyrenees, but the output is not adequate to the demand. Some copper is obtained near Lyons. Other metals include zinc, nickel, sil-

ver, lead, and antimony. France is rich in building material and quarry products. Granite, limestone, and sandstone are abundant, and a fine grade of marble is quarried in the Alps and the Pyrenees. Roofing slate is quarried in the Ardennes and phosphate rock occurs in several localities. The latter is used in the manufacture of fertilizers.

AGRICULTURE. France is distinctly an agricultural country, being favored by a mild climate and general fertility of the soil. The methods employed by the peasants are modern and tillage is conducted with great care. About 6,750,000 people are employed in agricultural pursuits and fifty-eight per cent. of the land is under cultivation. Wheat, rye, barley, and oats are the staple cereals. In the production of wheat France exceeds all countries of Europe, except Russia. Beets are grown extensively for the manufacture of sugar. The government has a monopoly in the cultivation of tobacco. Other products include flax, maize, potatoes, rape, hemp, and buckwheat. Vegetables are produced in all sections, while fruits abound extensively, though they are grown most successfully in the southern portion, where the peach, pear, orange, lemon, fig, and citron thrive. The adaptable condition of the soil for the production of forage crop has caused France to rank as a leading country in the rearing of cattle, horses, sheep, and goats. However, it is necessary to import meat, but eggs, honey, and dairy products are exported. Dairying is an important industry and in many sections is associated more or less with the rearing of swine. The culture of silkworms receives marked attention in the warm portions, where it is fostered on a large scale. The vineyards are especially prolific and about one twenty-fifth of the whole surface is planted to vines.

COMMERCE. France has fostered a policy of tariff protection, especially during the period following the War of 1870-71, but more liberal rates have prevailed since 1882. Raw cotton, wool, raw silk, timber, cereals, and coal and coke are the chief imports, while the exports include leather, cotton and silk textiles, metal goods, chemical products, wine, and clothing. The nations that have the largest share of foreign trade are Great Britain, Belgium, Germany, Algeria, and the United States in the order named. The foreign trade has an annual value of $2,250,000,000 and the exports slightly exceed the imports. Foreign trade is promoted by an efficient merchant marine, which consists of about 1,500 steamers and 15,000 sailing vessels.

MANUFACTURES. France ranks as the fourth manufacturing country, being exceeded only by Great Britain, Germany, and the United States. In the output of textile fabrics, especially silk goods, it has long held a prominent place. The textile fabrics center largely at Lyons, Rouen, and Paris. Cotton and woolen goods are made in large quantities at Rheims and Amiens; lace and gauze, at Saint Quentin; tapestry at Paris and Beauvais; and carpets, at Abbeville. Large quantities of safes, files, hardware, jewelry, and optical instruments are manufactured for exportation. In the manufacture of wine France has held a foremost position many centuries, and its cognac is still the leading product of the kind in the world. It likewise has taken a foremost position in the manufactures of engines, motors, and automobiles. Fruit canning is carried on extensively and the fisheries yield many products employed in manufacturing. Special mention may be made of the tunny, anchovy, oyster, mackerel, and sardines, all of which are cured and canned.

TRANSPORTATION. Extensive railroad and canal facilities make it possible to carry on a vast interior commerce, and to bring the products for shipment to the principal seaports. The railways are largely under direct government supervision and in efficiency take a peculiarly high rank. They aggregate a total of 31,750 miles, hence Germany and Russia are the only European countries that have a larger mileage. Paris is the converging center of all the railway systems of France, with the exception of one line. The canals aggregate 2,975 miles and the navigable streams have a length of 5,500 miles. In addition there are many electric railways throughout the more populous sections of the country, and the highways are generally in a good condition. The canals connect the various river basins and facilitate transportation to the Atlantic Ocean, the North Sea, and the Mediterranean. Among the most important of the canals are the canal of Languedoc, which connects the Garonne with the Mediterranean; the Rhone and Rhine canal; and the canal of Bourgogne. Telegraph and telephone lines are everywhere manifest and efficiently managed, and, like the canals and railroads, are largely under direct government supervision and ownership.

GOVERNMENT. The government of France is a constitutional republic, in which three departments of government are recognized, and dates from Sept. 4, 1870, when the second empire was overthrown as a direct result of the Franco-German War. Its legislative authority is vested in two chambers, the Chamber of Deputies and the Senate. Representation in the former is elective and in the latter it is appointive by officials of the departments. In the Chamber of Deputies are 584 members, chosen for four years, and the Senate is composed of 300 members, elected for nine years, one-third retiring every three years. The entire country is divided into 87 departments. Each of these is divided for election purposes into *arrondissements*, and these are subdivided into smaller divisions for the purpose of local government. The system of justice, like that of Canada and the United States, originates in inferior courts,

and, after passing through courts of appeals, terminates in the supreme court of the state, which has its seat at the capital. Cases of attempt against the safety of the state or of plotting to change the form of government are tried by the Senate, which is then constituted as a high court of justice. The president is elected for a term of seven years by the two chambers, a majority of both bodies being necessary to a choice. He has the appointment of civil and military posts, and is assisted by twelve ministers whom he appoints. The ministry consists of ministers of the interior, finance, war, justice and public worship, marine, colonies, public instruction, foreign affairs, commerce, agriculture, public works, and labor.

EDUCATION. Educationally France occupies a high position among the countries of Southwestern Europe. The minister of public instruction, who is appointed by the president and is a member of the cabinet, has supervision of all the branches of education and is assisted by an educational council. Primary, secondary, and high schools are maintained under appropriate courses of study, and they are supplemented by colleges and universities devoted to industrial art, law, theology, literature, and medicine. All the communes are required to have primary schools, but, where the population exceeds 500, the schools for boys and girls are separate. In the capital of each department and some other cities are institutions of higher learning, the whole number being about 275. In 1918 the secondary schools were attended by 127,642 and the universities by 34,368 students.

DEFENSE. Military service is obligatory on every Frenchman from the age of 20 to 45 years, who is not declared unfit for military duty. The present peace footing is 575,000 men and officers, though the entire war strength, including the colonies, aggregates 3,500,000 men. France occupies a high position in the naval administration, which is divided into three marine divisions. The number of men and officers in the navy is placed at 54,350. It has 44 battleships completed or in the course of construction and a proportionately large number of protected cruisers, torpedo boats, and torpedo boat destroyers. The principal sources of revenue are land taxes, registration, customs and excises, railroads and telegraphs, and licenses. The total national debt is larger than that of any country in the world, being about $6,800,000,000, and the revenue and expenditures are correspondingly large.

INHABITANTS. More than a million of the inhabitants of France proper are foreigners, mostly of European birth, while the rate of increase in population is very small, but there is a small preponderance of births over deaths. However, the increase of the last several decades may be attributed to immigration. The three chief religious denominations are Roman Catholic, Lutheran, and Jewish in the order named. Religious worship has been free since the adoption of the Organic Articles in 1802, but the three churches named were subsidized by the state until 1905, when the law which separates the church and the state came into force. About two-thirds of the people are nominally Roman Catholics. Fifteen cities have a population of more than 100,000. Paris, the capital and largest city, is one of the most important centers of population in the world. The other cities of importance include Lyons, Marseilles, Bordeaux, Lille, Toulouse, Nantes, Saint Etienne, Havre, Rheims, Roubaix, Rouen, Rennes. The population of France, exclusive of the colonies, in 1911, was 39,601,509.

COLONIES. The colonial possessions of France have an area of 4,055,150 square miles and a population estimated at 56,675,000. They are variously distributed in Asia, Africa, America, and Oceania, and have been the means of greatly increasing foreign trade and influence. The larger part of these possessions is African and the colonies of Oceania are not particularly valuable. The latter include New Caledonia and a number of dependencies.

The French colonies of America are Guiana, Guadeloupe, Martinique, Saint Pierre, and Miquelon, and those of Asia include Indo-China, Annam, Cambodia, Cochin-China, Tonkin, and Laos. The African possessions embrace Algeria, French Congo, French Guinea, Comoro Isles, Dahomey, Ivory Coast, Mayotto, Madagascar, Somali Coast, Réunion, Senegal, Niger, Senegambia, Tunis, and Western Sahara.

LANGUAGE. Before the Romans occupied Gaul, Celtic was the chief dialect spoken in the region now occupied by France, and that language is still spoken in Brittany. The French language is classed with the Romanic group, of which it is the most important dialect, the other languages of this group being the Spanish, Italian, Portuguese, Provençal, and the Wallachian or Romanic. After Roman occupation the Gallic, Celtic, and other local dialects gradually became modified by the introduction of new elements, and by the 8th century a marked distinction existed between the popular language of France and the classic Latin. They were distinguished by the names *Romana* and *Latina*, and, when the new Romance tongue became generally adopted, it was named *French*. Louis the German in 842 took an oath in the Romance tongue in Strasburg, and this is regarded the oldest written document in that dialect extant. Francis I. prohibited the use of Latin at court in the beginning of the 16th century, since which time French has been recognized as the national language. French is spoken generally throughout the country, but Flemish and German are used locally on the border of Belgium and Germany, and Italian is spoken in the southeastern part. It has been the language of diplomacy, cookery, fine art, and the European aristocracy since the Middle French

period. Its greatest popularity was attained in the reign of Napoleon, though it is now the language of about 50,000,000 people, and its literature is exceptionally rich.

LITERATURE. The literature of France is both extensive and valuable, embracing many products of a large number of eminent writers. It may be said to begin with the 11th century, when numerous poems were collected and published. These poems embrace at least three classes, including those that relate to the achievements of Charlemagne and his descendants; those relating to ancient history, particularly Alexander the Great; and those detailing the life and achievements of King Arthur. Philippe de Comines (1445-1509) is one of the first historians of eminence, dealing with the life and times of Louis XI. and his contemporaries, but the writings of Froissart (1337-1410), which include a collection of poems and tales of the chivalry of the 14th century, are perhaps the most popular productions of the early period. French literature was greatly modified by the revival of classical learning, when public thought was directed to classical study and sacred history. The humorist Rabelais (1490-1553) belongs to the same period, as also does the essayist Montaigne (1533-1592). In that period the great theological work of John Calvin, entitled "Institution of the Christian Religion," exercised a wide influence upon the public thought of France, and was the cause of inducing many writers to turn with renewed vigor to works in prose. Clément Marot (1495-1544) wrote numerous witty poetic productions, while Margaret of Navarre issued popular tales, and Jodelle (1532-1573) gave an impetus to tragedy.

With the advent of Louis XIV. came the golden age of French literature. At that time Pierre Corneille (1606-1684) wrote his masterpieces, entitled "Horace," "Cid," "Cinna," and "Polyeucte;" Pascal (1623-1662) created interest by his "Provençal Letters;" and Racine (1639-1699) wrote his "Iphigenie Phedre," "Athalie," and other noted comedies for the stage. Fine works in prose were added to the general writings by Jean Louis Balzac (1594-1654) and Voiture (1598-1648), while Descartes produced works of high philosophical value. Molière wrote his familiar plays, "School of Women," "Misanthrope," and "Tartufe," and elegant sermons were added to French literature by Massillon, Bossuet, and Bourdaloue. Other writers of the 17th century include the historians, Cardinal de Retz and Madame de Sévigné; the biographical writers, Saint Evremond and La Rochefoucauld; and the miscellaneous writers, Le Sage and Bernard Fontenelle (1657-1757).

Many works of philosophical value were added to the literature in the 18th century, but that period likewise produced much of value in other essential lines. Voltaire not only wrote valuable works in philosophy, but also holds a high place as a historian, dramatist, and poet, and for more than half a century stood at the head of French letters. The satirist, Montesquieu, is the author of "Persian Letters" and of many historical and general works, including "Spirit of the Laws." As a writer of elegant style and profound thought Rousseau stands next to Voltaire, his chief works being "Nouvelle Heloise" and "Confessions," while his "Social Contract" and "Emile" continue to exercise a wide influence in education and politics. The "Encyclopaedie," an extensive review of general subjects, though quite hostile to religion, was published by Diderot and D'Alembert. Other works of importance include Prevost's "Manon Lescaut," Saint Pierre's "Paul and Virginia," Beaumarchais' "Barber of Seville," and Buffon's "Natural History." Helvetius, Lamettrie, Condorcet, and Condillac may be mentioned as other writers of note.

The 19th century produced a large number of writers, owing largely to the brilliant achievements of Napoleon and the general establishment of schools and institutions of higher learning. In that period rose the so-called Romantic School, of which Victor Hugo, Alfred de Vigny, and Alexandre Dumas are leading representatives. "Les Miserables" is the masterpiece of Hugo, while "Cinq-Mars" is the best novel from the pen of De Vigny, and "Three Guardsmen" and "Count of Monte Cristo" are popular works by Dumas. Among the novelists of eminence are Honoré de Balzac, who belongs to the so-called Realistic School, George Sand, Eugène Sue, Gustave Flaubert, Victorien Sardou, and Octave Feuillet. Jules Simon, Bastiat, and De Tocqueville rank among the eminent writers on political economy; Guizot, Thiers, Victor Duruy, and Henri Martin among the historians; Victor Cousin, Auguste Comte, and Lamennais among the philosophical writers, and Cuvier and Saint-Hilaire among the scientific writers. Stanislas Julien and Burnouf added much of value to Oriental knowledge; Leconte de Lisle, Gautier, and Theodore Aubanel to poetry, and among the essayists and literary critics are Gustave Planché, Théophile Gautier, and Paul de Saint-Victor.

The beginning of the 20th century witnessed unusual activity in French literature. It is evident that the century will be unusually prolific and that the productions will excel in number and value those of the previous period. Among the eminent historians are Ernest Lavisse and M. Rambaud; among the poets, Henri de Régnier and Paul Verlaine; among the critics, Charles Bernard Renouvier and Edgar Quinet; and among the general writers, Émile Zola, Marcel Monnier, Alphonse Daudet, Émile Faguet (born in 1847), and Frederick Masson. For several years at the beginning of the century much was written upon social and political events, owing to the long discussion of the

Dreyfus affair. Such writers as Émile Zola and Anatole France wrote much on the side of Dreyfus, while Bourget, Barrès, and Brunetière took a position in opposition to the influences created by the affair. The period has been especially prolific in the field of fiction and the drama.

HISTORY. Julius Caesar, who wrote regarding his invasion and conquest in 59 B. C., furnishes the first authentic history of France. The Roman name was Gallia, while the early English was Gaul, and the people were largely Celtic in race, though other settlements were maintained, especially by the Aquitani and Belgae, with here and there tribes of Germans and Greeks. At that early period it contained parts of Switzerland, Germany, and Belgium, as well as the whole of France. The name France was derived from the Franks, a Germanic tribe that made settlements in Gaul after the decline of the Roman Empire. By the 2d century A. D. it was Romanized in civilization, language, and religion. Under the Roman rule it advanced materially in civilization and refinement and the population increased rapidly. Gradually agriculture and manufacture took the place of the simpler arts of the semisavage people.

The Franks by the end of the 5th century made themselves masters of nearly all of France and conquered adjacent territory east of the Rhine. In 481 Clovis, a descendant of Merovig, established the first dynasty, called the Merovingian, with his capital at Paris, and reigned until his death in 511, when his kingdom became divided among his four sons. The country was subsequently divided among other rulers under a general law of inheritance, by which numerous principalities rose. The last of the first dynasty terminated in 752, when the Carlovingian arose, its greatest representative being Charlemagne, who was the second ruler. At that time there was no real kingdom of France, for the reason that the first dynasty was Germanic, and Charlemagne founded a German rather than a French empire.

The true founder of the French monarchy was Hugh Capet, who established the Capetian dynasty in 987, and added the fiefs of Orleans and Paris to the monarchy. For two centuries the Capetian dynasty endeavored to reconquer former prerogatives from vassals, and strained its powers in resisting English pretensions to the crown of France. The first branch of Capetian kings became extinct with the death of Charles IV., in 1328, for the reason that the Salic law excluded female succession. At that time the crown passed to Philip of Valois, who ascended the throne as Philip VI., which led to a series of wars with England on account of the claims made by Edward III. to the throne, and these continued for 125 years. The most important battles occurred at Crécy in 1346, Poitiers in 1356, and Agincourt in 1415. All of these resulted more or less favorably to England and gave that country many of the best provinces, while the Treaty of Troyes, drawn shortly after the Battle of Agincourt, recognized the succession of Edward III. to the crown of France. The animation of the French, due to the noble deeds of Joan of Arc between 1429 and 1431, caused a complete change and drove the English from the country, the only possession remaining to them being Calais.

Louis IV. laid the foundation of a great monarchy in 1461, largely restored internal peace, and brought back a feeling of nationalism. The Valois-Orleans branch of the Valois line succeeded to the throne in 1498, but in 1515 the crown reverted to another branch of the house of Valois in the person of Francis I. This sovereign carried forward the attempts to conquer Italy begun by previous monarchs, and became involved in five great wars with Germany, which terminated in the loss of some prestige and the transfer of Savoy and Piedmont by the Treaty of Cateau-Cambresis, though this loss was at least partly balanced by securing Calais, the last possession of the English in France. Francis II. reigned only in 1559-60, but during this brief time the Catholic house of Guise attained power, while the opposing movements for the reforms were led by the house of Bourbon. The religious wars of this epoch shed much blood and retarded the industrial growth of France. Within this period occurred the massacre of Saint Bartholomew, and the great national debt which weighed upon France more than two centuries was fastened upon the country. The religious wars terminated only when Henry IV., previously King of Navarre, went over to the Catholic Church from the leadership of the Huguenots.

Louis XIII. succeeded to the throne in 1610 and inaugurated a new policy by siding with Richelieu, a Protestant prince, in a reformation. At his death in 1643, Louis XIV. began a memorable reign, which was marked by a still more vigorous policy and led to the highest power and widest influence attained by the French monarchy. Under his wise direction French literature, art, and science developed to a higher plane than before known, education flourished, and the borders of France were extended to the Rhine. The efficient service of the military engineer, Sébastien Vauban (1633-1707), strengthened French fortifications, while its ministers secured advantageous commercial treaties. Louis XV. added Corsica and Lorraine to France by the Treaty of Paris. However, in 1763 French colonies were largely ceded to England on account of misfortunes in war.

The weakness of Louis XVI., the success of the American Revolution, and the great spirit of unrest that marked the closing of the 18th century led to the revolution of 1789. War raged with all its horrors and cast an unfortunate people into a great sea of bloodshed, which

finally led to the execution of Louis XVI., in January, 1793. This was followed by a treaty of peace and the general amnesty of 1795. The French Republic was recognized by the Treaty of Basel in the same year, while a new constitution was formulated by the convention, which finally dissolved in October. The scheme of government provided a chamber of 500 to propose laws, the chamber of ancients to approve them, and the executive of five members called the Directory. Napoleon Bonaparte soon became the most prominent man in France. His successes led to the overthrow of the Directory and the establishment of the Consulate, himself being appointed first consul for a term of ten years. The brilliant victory won on the battlefield of Marengo and the extension of France to the Rhine led to the proclamation in 1804, by which he became emperor, and was soon after confirmed by a popular vote of the people. Pope Pius VII. consecrated Napoleon emperor at Paris, and crowned him King of Italy in 1805.

Though an extensive coalition was formed against Napoleon by European powers, they were unable to check his career and France became the greatest power of Europe. The great Battle of Austerlitz in 1805 caused the King of Naples to be dethroned, Holland became a vassal kingdom, and Prussia was humiliated. At that time the kingdom set up by Napoleon extended from Naples to Denmark and the capitals were Amsterdam, Paris, and Rome. The Russian invasion of 1812 cost France 300,000 men, but the allied forces were defeated in the Battle of Leipzig in 1813. In 1814 the allied armies drove the French from Germany and captured Paris, on March 30. Napoleon was required to abdicate and retired to Elba as a mere prince. Louis XVIII. became King of France and concluded the Peace of Paris, but was soon driven from power by the return of Napoleon, who assumed authority without resistance. The allied powers reorganized, brought on his final defeat at Waterloo in 1815, and sent him a prisoner to Saint Helena.

The long line of French kings ended with Louis Philippe, who was driven into exile by the revolution of 1848, and a republic was proclaimed with Louis Napoleon as the president. By a vote of the people he was made emperor in 1851, with the title of Napoleon III. The growing discontent of the people caused him to declare war against Germany in 1870, which resulted in a disastrous loss to the French army upon every battlefield, and the empire ended with the capture of Napoleon and 83,000 men at Sedan. As a war indemnity France was required to cede Alsace and a part of Lorraine to Germany and pay $1,000,000,000 in gold. Civil war broke out in Paris under the leadership of the Commune, which was put down with difficulty.

The second republic having been organized, M. Thiers was chosen the first president. With the overthrow of the administration in 1873 came the election of Marshal MacMahon, who resigned the presidency in 1879, and was succeeded by Jules Grévy. The last mentioned was followed in the presidency by Sadi Carnot in 1887. After the assassination of Carnot in 1894, Jean Casimir-Périer succeeded to the presidency, and, when the latter resigned in 1895, Felix Faure attained the election. President Faure died on Feb. 16, 1899, and was succeeded by M. Loubet. In 1906 Clément Armand Falliéres was elected president by the liberal party. He was succeeded as president in 1913 by Raymond Poincaré. The present republic has enjoyed a long era of prosperity and healthful growth in commerce. In 1914 it became involved in the Great European War. See **War.**

FRANCE (fräns), **Anatole,** poet and novelist, born in Paris, France, April 16, 1844. His real name was Jacques Anatole Thibault, but he is generally known by his literary name of Anatole France. He studied at Stanislas College, Paris, and became attached to the work of a librarian. In 1876 he began to contribute to a number of periodicals and soon after published "The Crime of Sylvestre Bonnard." He was honored by being elected a member of many educational and literary associations. His works include "The Red Lily," "The Garden of Epicurus," and "Opinions of the Abbe Jerome Coignard."

FRANCHISE (frăn'chĭz), a special privilege granted by government to individuals or corporations, and which do not belong to the citizens of the state or country by common right. In a political sense the term franchise denotes the right of suffrage and is commonly callec the *elective franchise.* However, it is generally applied to special privileges granted for the purpose of constructing improvements for profit, such as the establishment and operation of toll bridges and ferries. Towns and cites grant franchises to gas, water, heating, and electric light companies, and the alleys and streets are used for the purpose of promoting the business in which such concerns are interested. Formerly franchises of this kind were granted by the town or city council, but in most states and countries such privileges can be obtained only by a direct vote of the majority of the people, the proposition to make the grant being submitted to the electors at a regular or special election. A common instance of a franchise or charter is one granted by the state or province to certain persons, which authorizes them to engage in business as a corporation. Franchises of this kind as well as those granted by towns and cities to operate and control public utilities are in most cases subject to a special tax.

FRANCIA (frän'chá), **Francesco,** painter and engraver, born in Bologna, Italy, in 1450; died in 1518. His real name was Francesco di

Marco Raibolini. He was the son of a carpenter and worked at the trade of a goldsmith until 1490, but in the meantime gave much attention to painting and engraving. Later in life he took up a line of fresco painting, the most notable example in the series being illustrations from the life of Saint Cecilia. He painted some fine work for the Bentivoglio Chapel, including an altarpiece with exceptionally fine portraits. Among his well-known works are paintings of the "Madonna Enthroned," at Bologna; "Saint Stephen, in the Borghese Palace at Rome; "Madonna," in the Museum of Berlin; and "Virgin in a Rose Garden Adoring the Christchild," in the Munich Gallery.

FRANCIS I. (frăn'sĭs), King of France, born in Cognac, France, Sept. 12, 1494; died March 31, 1547. He was a student of science and chivalric literature, married the daughter of Louis XII., and succeeded him as king on Jan. 1, 1515. Shortly after ascending the throne, he sent a force against Milan with the intention of annexing it to his dominion. His advance was opposed by the allied armies of Henry VIII. and Charles V., who had formed an alliance with the Pope. They expelled his forces from Italy and shortly after invaded northern France. In 1525 he was taken prisoner at the Battle of Pavia and was kept in confinement at Madrid for a year, but was given his freedom on the expressed condition of surrendering all claims to his Italian possessions, Artois, Flanders, and the duchy of Burgundy. Since Charles V. of Spain was a rival candidate for the imperial crown of Germany, the war between him and Francis I. continued, but it was finally terminated in 1544 by the Treaty of Crespy. Within his reign the revival of learning greatly influenced France, the Protestant Reformation had its beginning, and the power of the monarchy was strengthened. Learning and art rose under his policy of inviting scholars and painters to the cities. He fostered the building of highways, palaces, libraries, and institutions of higher education. His character was marked by a gay and amiable disposition, heroic impulses, and acts of liberality. However, his policy of persecution actively conducted against the Vaudois placed him in an unenviable light.

FRANCIS II., King of France, eldest son of Henry II. and of Catherine de Medici, born in Fontainebleau, Jan. 19, 1543; died Dec. 5, 1560. He married Mary Stuart, daughter of James V. of Scotland, afterward Queen of Scotland, in 1558, and ascended the throne of France on July 10, 1559. He was then a sickly boy of about sixteen years. The government was under the influence of the Duke of Guise and the country was disturbed by civil contentions during his brief reign.

FRANCIS I., Holy Roman Emperor, born Dec. 8, 1708; died at Innsbruck, Aug. 18, 1765. He was the son of Leopold, Duke of Lorraine, married Maria Theresa, daughter of Charles VI., in 1737, and was crowned emperor on Oct. 4, 1745, as successor to Charles VII. His administration was disturbed by a long war against Frederick the Great, known as the Seven Years' War, in which Austria and Prussia contended for supremacy. He was succeeded in Germany by his son, Joseph II., under the regency of his mother, and in Tuscany by his younger son, who afterward became Leopold II.

FRANCIS II., Holy Roman Emperor and Francis I., Emperor of Austria, eldest son of Leopold II., grand duke of Tuscany, born in Florence, Italy, Feb. 12, 1768; died March 2, 1835. His father became Emperor of Austria in 1790 by the death of his brother, Joseph, and two years later the crown devolved upon Francis. The French revolution was fast organizing and exciting alarm among the dynasties of Europe, which induced Francis to conclude an alliance with Prussia against the new republic, and, after a series of hostilities, the Peace of Campo Formio was concluded in 1797. He formed a new alliance with Russia and England in 1799 with a view of humbling the pride of France. At first the allies were successful in Italy, Germany, and Switzerland, but, after the return of Napoleon from Africa, Austrian power was paralyzed by the French victories at Hohenlinden and Marengo. These successes were followed by Francis ceding the left bank of the Rhine to France. When France was declared an empire in 1804, Francis assumed the title of hereditary Emperor of Austria.

In 1805, hostilities were renewed between Austria and France, but the great Battle of Austerlitz terminated in the Peace of Presburg, by which Francis surrendered Tyrol and the Venetian states. By this treaty the Holy Roman Empire, which had prevailed about 1,000 years, was dissolved, and Francis assumed the title of Emperor of Austria and King of Bohemia and Hungary. In 1809 Francis again became a leader in the war against France and secured a victory at Aspern, but Napoleon soon after occupied Vienna and dictated terms of peace, the chief condition of which required Francis to surrender 42,000 square miles of territory. History accords him a place among the extreme absolutists in politics, an advocate of the centralization of administrative powers. He labored indefatigably for the welfare of the people, encouraged education, built canals and highways, introduced manufactures, and sought to solidify the German states. However, his designs were frustrated by the extreme unrest and excitement of the Napoleonic wars.

FRANCIS, David Rowland, public man, born in Richmond, Ky., Oct. 1, 1850. After attending the public schools in Kentucky, he studied at the Washington University in Saint Louis, from which he graduated in 1870. He first engaged as shipping clerk, then was in the grain commission business, and in 1884 was elected president of the Merchant's Exchange.

In 1884 he attended the Democratic national convention in Chicago as a supporter of Cleveland, and in 1885 was elected mayor of Saint Louis. His successful administration brought about his election for Governor of Missouri in 1888, and after the expiration of his term of office he retired from active politics, but accepted the position of Secretary of the Interior in Cleveland's Cabinet in 1896. He was president of the Louisiana Purchase Exposition in 1904, and in that office gave evidence of much ability as a man of affairs. Subsequently he traveled extensively and visited many of the leading countries of the world.

FRANCIS, Saint, noted saint of the Roman Catholic Church, known as Francis of Assisi, founder of the order of Franciscans, born in Assisi in 1182; died Oct. 4, 1226. His early youth was marked by a disposition of innocent gaiety. He secured a liberal training and devoted his life to religious culture. In 1209 he founded the order of Franciscans, though he had but two followers, and devised rules for the guidance and instruction for those whom he taught. Its teachings require the members to devote themselves strictly to a compliance with the injunction to preach the gospel to all people, to do the greatest possible good, and to let each day care for itself. Pope Innocent III. approved the order in 1210, and two years later the church Sta. Maria degli Angeli was set apart for the occupation of its members. The effects of his work extended so rapidly that it was possible to hold a general assembly with 5,000 members in 1219, at which a better understanding and greater inspiration were obtained. The Sultan of Turkey granted the Franciscans the guardianship of the Church of the Holy Sepulcher in Palestine, which is still in their charge.

FRANCIS FERDINAND, archduke of Austria-Hungary, born Dec. 18, 1863; assassinated June 28, 1914.. His father, Archduke Carl Ludwig, was a brother of Francis Joseph. In 1889 he became heir-apparent, at the death of Prince Rudolph, only son of Francis Joseph, and the following year married Sophie of Hohenberg. The royal couple was murdered in Servia, while visiting Sarajevo, the capital. This circumstance was the direct cause of the Great European War, which began July 28, 1914. See **Charles I.**

FRANCIS JOSEPH I., Emperor of Austria and King of Hungary, nephew of Emperor Ferdinand I., born Aug. 18, 1830. He became Emperor of Austria on Dec. 2, 1848, and King of Hungary on June 8, 1867. He was educated in the best schools of Austria and learned to speak the various languages and dialects spoken in the Austro-Hungarian dominion. In 1854 he married Princess Elizabeth (q. v.), daughter of Duke Maximilian Joseph. A constitutional monarchy was promised before ascending the throne, but he assumed absolute power by dissolving the national assembly, which resulted in a rebellion led by Hungary. These disturbances were put down with the assistance of Russia. National ties were strengthened by measures designed to extend educational arts, reform the civil service, and enlarge internal improvements. At the time of the Crimean War he remained neutral, and in 1855 signed a concordat with the Pope by which the clergy secured large influence over educational affairs.



FRANCIS JOSEPH I.

In 1859, at the beginning of the war between France and Italy, he took the field in person. His forces were defeated at Magenta and Solferino, which resulted in the loss of Lombardy. In 1864 he formed an alliance with Prussia to annex Schleswig-Holstein, which resulted in a dispute over the division, and led to the war of 1866 between Austria and the allied forces of Prussia and Italy. This war, known as the Seven Weeks' War, ended with the defeat of the Austrians at Sadowa, and caused Austria to be excluded from the North German Confederation. Francis assumed a conciliatory policy in 1865. Soon after a constitution was granted, Hungary became reconciled, and the crown of the King of Hungary was accorded to him. Since then Austria has been prosperous, a result following the reform of its civil laws. The concordat was suspended in 1870, when the educational affairs were placed under the direction of the national government, higher institutions of learning multiplied, and internal improvements were fostered. In 1908 he issued a proclamation by which Bosnia and Herzegovina were formally annexed to Austria-Hungary. He died Nov. 1, 1916, at the age of 86 years, and was succeeded by Charles I.

FRANCIS MOUNTAINS, a group of the White Mountains, in New Hampshire, from which they are separated by the White Mountain Notch. Mount Lafayette, height 5,295 feet, is the highest peak. Many beautiful lakes, steep precipices, and natural forests give the region a grand and beautiful aspect.

FRANCIS XAVIER. See **Xavier.**

FRANCKE (fräṇ'kę), **August Hermann,** teacher and theologian, born in Lübeck, Germany, March 23, 1663; died June 8, 1727. He graduated at Leipzig in 1685 and began to deliver biblical lectures there while a student. Later he secured an appointment at Lüneburg and afterward at Dresden, and in 1689 returned to Leipzig as a lecturer on topics relat-

ing to the Scriptures. In 1695 he was called to Halle, where he accepted the professorship in Oriental languages. About the same time he secured an appointment as minister for the suburb Glaucha, where the neglected condition of the children attracted his attention and caused him to organize a school to promote their elementary training. In 1698 he founded an orphan asylum, and a few years later established a pedagogium and Latin school with dormitories attached. This establishment grew rapidly in public favor and in 1714 was attended by 920 girls and 1,080 boys, who received instruction from 178 teachers under the superintendence of Francke. Nearly all the instructors were students at the University of Halle and received their board and lodging for their services. The success and widespreading influence of his educational establishment gave a new impetus to modern education and made Germany the land of pedagogy. The institution founded in Halle still flourishes and retains a high moral tone. The system of public education established in Prussia by Frederick William I. is modeled after the plans of Francke. He published a number of works on religion and pedagogy.

FRANCO-GERMAN WAR, a military contest between France and Germany, caused chiefly by the jealousy of Napoleon III. of the growing importance of Prussia. Bismarck had determined to place Prussia at the head of a united Germany, owing to which Austria was excluded after the war of 1866, when the growing sentiment for German nationality threatened to isolate France. The crown of Spain was offered by General Prim to Leopold of Hohenzollern, a prince of the reigning family of Prussia, which excited the jealousy of Napoleon, who demanded that Leopold should retire as a candidate. Although the King of Prussia refused to demand this of Leopold, the latter declined the Spanish crown voluntarily, when Napoleon insisted that the King of Prussia should furnish a guarantee that the refusal would be final. This demand was of course refused, hence the French government formally declared war on July 19, 1870.

Both countries entered upon the prosecution of the war with marked enthusiasm, but France was comparatively illy prepared for the conflict. While that country had about 250,000 men ready to move forward in August, 1870, it had few available reserves. On the other hand, the North German Confederation was able to put 450,000 men into the field at once and had nearly that number of reserves available for active service. Napoleon had hoped that the South German States would refuse to join Prussia, but these, enthused with the sentiment of nationality, threw their influence against France. Three armies moved upon French territory, the first under General von Steinmetz at Trèves, the second under Prince Frederick Charles in Rhenish Palatinate, and the third under the Crown Prince of Prussia on the frontier of Baden.

The German armies, after winning successes at Weissenburg and at Wörth, succeeded in separating the two divisions of the French army under Marshals Bazaine and MacMahon. The former was repulsed in the Battle of Mars-la-tour, after which he took a position at Gravelotte, where he was defeated on August 18th by an army of 200,000 Germans. Bazaine now fell back upon Metz, where he was beseiged until in September, when he was compelled to surrender with an army of 175,000 men. In the meantime MacMahon was surrounded at Sedan, where he was defeated on September 2d and surrendered with an army of 83,000 men. Both Napoleon and MacMahon were among the prisoners of war.

The capture of Napoleon caused a revolution in Paris, where the republic was proclaimed two days after the fall of Sedan. However, the victorious armies marched upon Paris and placed it in a state of siege. Although efforts were made to relieve the capital, it was forced to surrender in February, 1871. The preliminary terms of peace with Germany were arranged by Thiers in the same month, and they were approved by the national assembly in March. France was required to cede Alsace and a part of Lorraine and pay a war indemnity of $1,000,000,000. It was provided in the treaty that German troops should occupy certain departments until the entire sum was paid. The final treaty of Frankfort was signed in May, 1871. As a result of the war, Germany was consolidated into an empire and France became a republic. **See War.**

FRANÇOIS (frän-swä'), **Kurt von,** explorer, born in Luxembourg, Belgium, in 1853. He studied for a military life at Wahlstatt and Berlin, and in 1870-71 served in the German army, most of the time under his father, General François, who was slain in the Battle of Spichern. In 1883 he joined the exploring expedition of Wissmann for service in Africa, and was one of the earliest explorers who penetrated northwest from the coast of Togoland. He was military commander in German Southwest Africa a number of years and in 1891 acted as imperial commissioner, in which capacity he explored the region inland as far as Lake Ngami and defeated the Hottentots in several engagements. In 1895 he resigned his commission and subsequently settled in German Southwest Africa. Among his published works are "Explorations of the Kassai," "In the Interior of Africa," and "Discovery of the Tschuapa and Lulongo."

FRANCOLIN (frăn'kō-lĭn), the name of several species of birds related to the partridges, native to Asia and Africa. The plumage is variegated, but in most species it is a yellowish brown with black and white mark-

ings and the bill and tail are long. The flesh is much esteemed for food, hence these birds are hunted as game. When alarmed, they conceal themselves in the brushwood or run with considerable speed, taking wing only when they are in danger. They feed early in the morning and late in the evening, when they search for grains, insects, and bulbous roots. Their flight is accompanied by a whirring sound, and their cry, uttered chiefly when in search of food and at pairing time, is something like a shrill laughter.

FRANKFORT (frăn̲k'fŭrt), a city in Indiana, county seat of Clinton County, on Prairie Branch River, forty miles northwest of Indianapolis. It is on the Lake Erie and Western, the Vandalia Line, and other railroads, and is surrounded by a rich agricultural, dairying, and fruit-growing country. Among the noteworthy buildings are the county courthouse, the public library, the high school, and a number of fine churches. It has electric and gas lighting, street paving, and a sewerage system. Among the manufactures are pottery, carriages, flour, cigars, machinery, and ironware. It has extensive railroad machine shops. Population, 1900, 7,100; in 1910, 8,634.

FRANKFORT, a city of Franklin County, Kentucky, capital of the State and of Franklin County, on the Kentucky River, sixty miles east of Louisville. It is on the Louisville and Nashville and the Chesapeake and Ohio railroads, in the center of the blue grass region, and occupies a fine site on both sides of the river, which is spanned by a suspension bridge 700 feet long. The chief buildings include the State capitol, the State arsenal, the Governor's mansion, the State prison, an institution for feeble-minded children, and the State normal school for colored students. It has several fine monuments, including those erected to the soldiers who died in the War of 1812 and the Mexican War. The State library contains over 100,000 volumes.

Frankfort has manufactures of pottery, twine, barrels, lumber products, vehicles, whisky, cotton goods, and machinery. It has extensive systems of electric street railways, sewerage, and public lighting. Franklin Cemetery, on one of the hills near the city, contains the grave of Daniel Boone. Frankfort was founded in 1786 by Gen. James Wilkinson, and became the capital of the State in 1792. Population, 1910, 10,465.

FRANKFORT-ON-THE-MAIN, a city in the province of Hesse-Nassau, Germany, twenty miles northeast of Mainz, on the Main River. The older part has narrow streets and many buildings in which the high gables project over the walls, but the newer section is modern and has many fine residences and tall structures of steel and stone. Ziel street is the chief thoroughfare and merges into Kaiserstrasse. The market place, or Römerberg, is in the heart of the older part of the city. Many tourists are attracted to the house where Luther lived, the one in which Goethe was born, and the noted Rothschild Library. Besides the public schools, it contains the Städel Art Institution, a museum of history, and many important societies of literature and art. In its squares and public parks are numerous statues of celebrated citizens, among them those of Gutenberg, Goethe, and Schiller. The most prominent of its buildings include the Cathedral of Saint Bartholomew, the public hall, the opera house, the courts of justice, and the central railroad station, the depot being one of the finest in Europe. Frankfort is one of the wealthiest cities of modern Europe and contains the ancestral home of the Rothschilds. It holds high rank as a center of manufacturing and in the volume of its jobbing trade. The streets are generally paved with stone and asphalt and traversed by electric street railways. Systems of sewerage, waterworks, and gas and electric lighting are operated by the municipality. Among the manufactured products are perfumery, ironware, soap, chemicals, clothing, sewing machines, leather goods, and fabrics. It received its name from Charlemagne, who made it the seat of a political and religious council in 794. The city became Protestant as early as 1530. It was the place of meeting for the German diet in 1816-36. In the 13th century it became a free city and after 1562 it was the place of election and coronation of the German emperors. Here have been concluded many important peace treaties, among them the treaty closing the Franco-German War, which was signed in May, 1871. Among the banking and money markets of Europe Frankfort takes very high rank. Population, 1905, 334,978; in 1910, 414,598.

FRANKFORT-ON-THE-ODER, a commercial city in the province of Brandenburg, Germany, on the Oder River, about fifty miles southeast of Berlin. Several railroad lines connect it with the national capital and the cities of Central Europe. The noteworthy buildings include the Church of Saint Mary, the Reformed Church, the city hall, or Rathaus, the theater, and the railway station. Among the manufactures are leather, machinery, fabrics, clothing, chemicals, pottery, furniture, toys, and porcelain. The river is navigable and is connected by canals with the Elbe and Vistula, thus giving ample outlet for its manufactured products, jobbing trade, and passenger traffic. Telephones, electric railways, a public library, the gymnasium, waterworks, and an extensive system of gas and electric lighting are among the public utilities. The city became a free municipality in 1253 and was important as a member of the Hanseatic League. It suffered greatly during the Thirty Years' War. Nearly all the inhabitants are Protestants. Population, 1910, 68,230.

FRANKINCENSE (frăn̲k'ĭn-sĕns), a gum or resin, which, when burning, yields aromatic fumes and is used extensively as an incense in religious services. The Greeks and Jews, as

well as other ancient peoples, employed olibanum, the product of a tree found in India, and it is still employed chiefly in the East. In Europe and North America it is more common to use the exudations of certain coniferous trees, such as the silver fir, which are resinous products. They exude from the trees and harden by exposure to the air. The taste is balsamic and the odor when burning is pleasant.

FRANKING PRIVILEGE, the right of sending letters and packages by mail free of charge. This privilege was extended in England to members of Parliament by the Postmaster-General and later by statute, but it was abolished in 1840. Official correspondence and public documents are transmitted through the mails by officials of the government free of charge in most countries, though this privilege pertains only to business which is related strictly to certain officers of the Federal departments. The United States granted the franking privilege to soldiers of the Revolutionary War, but individuals have not had privilege to send mail in this way since 1873. Envelopes and wrappers of packages used for official purposes are marked *Official Business,* both in Canada and the United States, and in some countries stamps bearing the imprint *Official* are used. Persons not entitled to the privilege of sending mail in such wrappers or under such stamps are subject to a heavy fine in case they procure and use them.

FRANKLIN (frăn̲k'lĭn), or **Frankland,** the name of a proposed State formed by the inhabitants of what is now Tennessee. They revolted from the control of North Carolina in 1784, framed and ratified a constitution, elected a Legislature and State officers, and undertook to conduct a civil war against North Carolina. John Sevier, the Governor of Franklin, raised an army, but was defeated in an engagement and taken prisoner. In 1788 the Legislature of North Carolina pardoned the offenders in Franklin, and two years later the territory was ceded to the United States government, hence the disturbance was quieted.

FRANKLIN, a large district in the northern part of the Dominion of Canada, including the Arctic Archipelago. It is located chiefly north of the Arctic Circle, only a small portion of Baffin Land extending farther south. The chief islands are Grinnell Land, Prince Albert Land, North Devon, Melville Island, and Baffin Land. Animal and vegetable life are very scant and the inhabitants, consisting chiefly of Eskimos, are not numerous. Important fisheries and minerals abound. The area is about 500,000 square miles.

FRANKLIN, a city of Indiana, county seat of Johnson County, twenty miles south of Indianapolis, on the Cleveland, Cincinnati, Chicago and Saint Louis and other railroads. It has several fine county buildings and is surrounded by a fertile farming region. The manufactures include flour, cigars, ironware, and machinery. It is the seat of Franklin College, a Baptist institution. Electric lights, waterworks, and a system of drainage are among the improvements. Population, 1900, 4,005; in 1910, 4,502.

FRANKLIN, a town of Massachusetts, in Norfolk County, 25 miles southwest of Boston, on the New York, New Haven and Hartford Railroad. It has a public library and a number of fine schools. The Dean Academy, a coeducational institution, is located here. The manufactures include pianos, clothing, and cotton and woolen goods. Franklin was incorporated in 1778. Population, 1905, 5,344; in 1910, 5,641

FRANKLIN, a city of New Hampshire, in Merrimac County, 95 miles northwest of Boston, Mass., on the Boston and Maine Railroad. It is located at the junction of the Winnepesaukee and Pemigewasset rivers, which form the Merrimac at this place. Water power for manufacturing is utilized extensively and the industrial enterprises are well established. Needles, hosiery, machinery, paper, woolen goods, and clothing are the manufactures. Waterworks and electric lights are included among the public utilities. Franklin is the seat of the New Hampshire Orphans' Home, and is noted as the birthplace of Daniel Webster. It was incorporated in 1828 as a town and its city charter was issued in 1895. Population, 1900, 5,846; in 1910, 6,132.

FRANKLIN, county seat of Venango County, Pennsylvania, on the Allegheny River, about seventy miles north of Pittsburg. It is on the Erie, the Pennsylvania, and other railroads, and has a large trade in farm produce, coal, and merchandise. The county courthouse, the public library, and the high school are among the chief buildings. It has two public parks, street pavements, and sewerage and waterworks systems. Among the manufactured products are machinery, flour, fabrics, oil, vehicles, and cigars. Valuable deposits of mineral oil and coal abound in the vicinity. Franklin was settled in 1753 and incorporated in 1795. Population, 1900, 7,317; in 1910, 9,767.

FRANKLIN, Battle of, an engagement of the Civil War in America, at Franklin, Tenn., on Nov. 30, 1864. General Hood, to counteract Sherman in his march to the sea, had taken a large force of Confederates into Kentucky and Tennessee, and was threatening an invasion of the states farther north. General Thomas, who had been with Sherman's army was sent north to Nashville, and General Schofield operated with a Federal force against Hood's army. Schofield strengthened his position at Franklin, on the Harpeth River, where he was attacked by the Confederates, who made desperate assaults, but were beaten back each time with considerable loss. The Federals withdrew to Nashville during the night, where they joined the army under Thomas. The Federals engaged in the Battle of Franklin numbered 25,000, while

the Confederates had about 40,000 men. Both sides fought with remarkable gallantry.

FRANKLIN, Benjamin, eminent statesman, born in Boston, Mass., Jan. 17, 1706; died in Philadelphia, Pa., April 19, 1790. He was the fifteenth of the seventeen children of Josiah Franklin, who emigrated to America in 1685. His father was a tallow chandler and soap boiler. Benjamin was apprenticed as a printer to his elder brother, who founded the *New England Courant,* and developed much fondness for books and writing. When seventeen years of age, he went to Philadelphia, where he arrived with $1.25, and by prudent economy saved sufficient to purchase the *Pennsylvania Gazette* in 1727, which had been started by Mr. Keimer. The following year he married Deborah Read, the daughter of a man with whom he had boarded when he first came to Philadelphia.



BENJAMIN FRANKLIN.

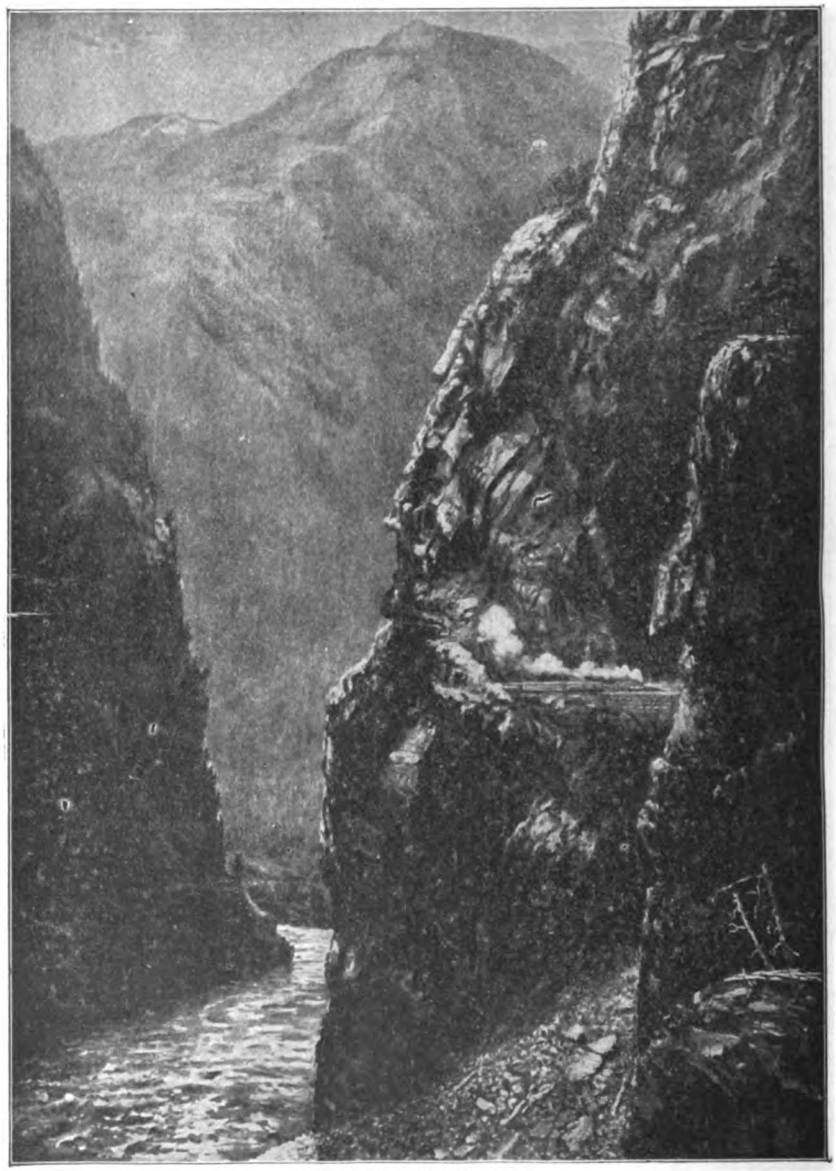
Franklin was appointed deputy general of the British colonies in 1753, and the next year served as a member of the Albany convention, in which he proposed an important plan for colonial union. During his leisure he experimented with scientific matters, for which purpose he fitted up a small laboratory, and made discoveries regarding the theory of positive and negative electricity. By the use of a kite he demonstrated that electricity and lightning are identical, and subsequently invented the lightning rod or conductor. His *Poor Richard's Almanac,* founded in 1732, was published until 1757, and was the source of some profit. It was a medium of considerable utility in the educational affairs of the colonists. He was the agent of Pennsylvania in England in 1757-62, and again from 1764 until the Revolution. A part of the intervening time he represented New Jersey, Massachusetts, and Georgia at the English court.

While Franklin's early education was limited, he ranked as a versatile reader from early youth. He obtained a wide fund of knowledge by self-activity, was elected a member of the Royal Society of England, and was granted academical degrees by Oxford and Edinburgh. In 1774 he presented the first petition of the American Congress to the king of England and was elected a member of Congress on returning to America. He favored the Declaration of Independence. In 1776 he was sent as commissioner plenipotentiary to France for the purpose of securing an alliance between that country and the United States, in which position he rendered valuable service to the American cause. The benefits accruing from his negotiations included loans of very large sums of money and later other valuable concessions. After the surrender of Burgoyne, he concluded an alliance with France, subsequently made a treaty with England, and later obtained a commercial treaty with Prussia. On his return from England, in 1785, he was chosen president of Pennsylvania. That State sent him as a delegate to the Federal convention in 1787 for the purpose of aiding in the formation of the Constitution, which, when completed, met his hearty approval.

Besides his *Poor Richard's Almanac,* he produced numerous papers on scientific subjects and on political economy and anti-slavery questions, but died before completing his "Autobiography," which is still read extensively in public schools. His grave and that of his wife are in the yard of Christ Church, Philadelphia, at the corner of Fifth and Arch streets. In early life he wrote a fanciful epitaph for himself, but it is not inscribed on the plain marble stone which covers his grave. It is a famous production, as follows:

"The Body
of
Benjamin Franklin, Printer,
(Like the cover of an old book,
Its contents torn out,
And stript of its lettering and gilding,)
Lies here food for worms.
Yet the work itself shall not be lost,
For it will (as he believed) appear once more
In a new
And more beautiful Edition,
Corrected and Amended
By
The Author."

FRANKLIN, Sir John, naval officer and explorer, born in Lincolnshire, England, April 16, 1786. He was the youngest son of an agriculturist, attended school at Saint Ives and Louth, and in 1800 entered the navy as a midshipman. The following year he took part in the Battle of Copenhagen. In 1801-03 he accompanied Captain Flinders on a voyage of discovery to Australia. On returning to England he was appointed to the *Bellerophon,* and at the Battle of Trafalgar managed her signals. In 1819 he conducted an exploring expedition from Hudson Bay to the interior of Canada, made a second expedition in 1825-27, and was knighted in 1829. In 1836-43 he was governor of Tasmania, two years later took command of the *Erebus* and *Terror,* and with an escort of 134 men and officers started upon an expedition of discovery to the Arctic seas, sailing from England on May 18, 1845, but he never returned. A document deposited in a cairn in 1847, and found in 1850, gave the latest details of the ill-fated expedition. From this it was learned that Franklin died June 11, 1847, that the crew abandoned the ship April, 1848, and that the survivors, 105 in number, entered upon a march to the Great Fish River. Although a



THE FRASER CANYON

In the narrow canyon of the Fraser River the persistence of man has built a railway that runs mile after mile along the edge of a dizzy precipice. Far below it rolls the river, swift, silent, and green with depth, while above it tower threateningly great cliffs on which struggling mountain shrubs here and there find a scant foothold.

(Opp. 1057)

number of relics of the company have been discovered, none of the party survived.

FRANKLIN, William Buel, soldier, born in York, Pa., Feb. 27, 1823; died in 1903. He studied at West Point, where he graduated in 1843, and was assigned to the corps of topographical engineers. In the Mexican War he was brevetted lieutenant for valuable service at Buena Vista and was made captain in 1857. He was appointed colonel in 1861, and as such officer commanded a division in the Battle of Bull Run. He took part in the Battle of White Oak Swamp, 1862; the Battle of South Mountain, 1862; and the Battle of Fredericksburg, 1862. Subsequently he was assigned to the Department of the Gulf. In 1864 he took part in the Red River Expedition and conducted the retreat to Alexandria. He was brevetted major general in the regular army in 1865, but retired the following year to engage in the manufacture of firearms at Hartford, Conn. In 1889 he was commissioner to the Paris Exposition, where he was awarded the insignia of grand officer of the Legion of Honor.

FRANKS, the name of a number of German tribes that inhabited the regions of the Lower Rhine in the 3d century. They defeated the Romans in Gaul and controlled France from that time until the rise of the Capetian dynasty in 987, giving to that country the Merovingian dynasty, from 481 to 987. For security against hostile tribes, they lived in villages. They committed their laws to writing, were industrious, and gave France the Salic laws. The descendants from these peoples now form the chief Germanic element of northern France and the western part of Germany.

FRANZ JOSEPH LAND (fränts yō'zĕf), an island archipelago in the Arctic Ocean, north of Nova Zembla. It was discovered by the Payer-Weyprecht expedition in 1873 and was named in honor of the Emperor of Austria, Francis Joseph I. The group includes about sixty islands, many of which are separated from each other by deep and narrow fiords and channels. They include Zichy Land, Wilczek Land, and Alexandra Land. The surface is generally rocky and level, from 150 to 500 feet above the sea, and several peaks have an altitude of 2,800 feet. Grass, mosses, and lichen are the chief plants. Polar bears, foxes, seals, and wild fowls are plentiful. The islands are not inhabited by man.

FRASER (frā'zĕr), the largest river of British Columbia, rises in the lake region of the Rocky Mountains. It has a general course toward the south, and, after flowing 740 miles, discharges into the Gulf of Georgia. The Fraser is navigable for more than 150 miles, contains valuable salmon fisheries, and flows through a mineral country rich in gold and silver deposits. Its principal tributaries are the Stuart, Thompson, and Chilcoten rivers. The lower valley, which is very fertile, is traversed by the Canadian Pacific Railway. Among the towns on its banks are New Westminster, Hope, Yale, and Lytton.

FRASERVILLE, a town of Temiscouata County, Quebec, 125 miles northeast of Quebec, on the St. Lawrence River and on the Intercolonial and on the Temiscouata railways. It has paving, gas and electric plants, saw mills, furniture factories, and machine shops. The features include the courthouse, city hall, federal building, and several churches. It was incorporated in 1874. Population, 1911, 6,774.

FRATERNAL SOCIETIES (frà-tĕr'nąl). See **Benefit Associations.**

FRATERNITIES, the name applied to various organizations of students in the colleges and universities of the United States. They are frequently termed College Secret Societies, or Greek-letter Fraternities, and members of them are sometimes spoken of as *Frats.* The names are taken from several letters of the Greek alphabet, as *Phi Beta Kappa,* and from these the secret motto of the fraternity is remembered, since these letters are the beginning of the words in the motto. The fraternities are composed of chapters, the latter being branches in the various colleges that belong to a particular fraternity. The largest number of members belong to the academic departments.

The first Greek-letter society was organized at the College of William and Mary, Virginia, in 1776, and named *Phi Beta Kappa.* Its purpose was announced to be friendly intercourse and literary advancement among scholars. However, the present fraternity system of the United States originated in 1825, when a number of students of Union College, New York, organized the *Kappa Alpha.* Similar organizations which are maintained by young women who attend colleges and universities are known as sororities. The first of these, known as *Kappa Alpha Theta,* was organized in 1870 at De Pauw University, Indiana. Since then many others have been established. The members who attend college are styled *active* and afterward they become known as *alumni.* Catalogues, magazines, and song books are published by many of the fraternities and a large number maintain chapter houses. Though opposition to societies of this kind has sprung up, they are defended by many leading educators, who have generally expressed their belief in the practical utility of college fraternities.

FRAUD, in law, any cunning or deception used to cheat or deceive another. It is essentially a false representation of some matter of fact, and is intended to deceive another as to his legal injury. The law distinguishes a false representation of fact, which is necessary in committing a fraud, from a mere expression of opinion. Frauds are classed as either actual or constructive. An *actual fraud* is one in

which the perpetrator is guilty of dishonest intention. *Constructive fraud* consists of acts which may not be dishonest in intention, but which are considered in law as being in bad faith. The case of a person charged with the duty of selling property for another, in which he himself is the purchaser, is considered constructive fraud, since it is assumed that he will make the purchase at the best price possible. A party who is guilty of fraud may be punished under the criminal code and at the same time be required in a civil suit to return the goods or settle the damages sustained by the owner.

FRAUNHOFER (froun'hō-fĕr), **Joseph von,** noted optician, born in Bavaria, Germany, March 6, 1787; died in Munich, June 7, 1826. After serving as an apprentice to a glass polisher, he entered upon a study of optics, and became a celebrated manufacturer and inventor. The superiority of his optical instruments enabled him to discover dark lines fixed on the solar spectrum, called *Fraunhofer's lines.* Later he found similar lines in the spectra of the moon and several of the planets. These discoveries led to the invention of the spectroscope and the development of the science of spectroscopy. Later he invented several devices useful in microscopy, a form of heliometer, and the stage micrometer. In 1817 he was elected a member of the Munich Academy of Sciences.

FRÉCHETTE (frā-shĕt'), **Louis Honoré,** poet, born at Point Levi, Quebec, Nov. 16, 1839. He was educated at Quebec Seminary and Laval University and in 1864 became a member of the bar. In 1874 he was elected to the Dominion Parliament, serving until 1879, when he engaged in journalism at Quebec. He was editor of three French newspapers, published respectively in Quebec, Montreal, and Chicago, and for some time served as president of the Royal Society of Canada. He wrote largely in the French language and is rightly considered one of the most able Canadian poets. A number of English works were translated into French by him, including Cable's "Creole Days" and Howell's "A Chance Acquaintance." Among his chief productions are "Veronica," "My Leisure Hours," "Pell-Mell," "The Legend of a People," and "Christmas in French Canada." He died June 1, 1908.

FREDERIC (frĕd'ĕr-ĭk), **Harold,** author and journalist, born in Utica, N. Y., Aug. 19, 1856; died Oct. 19, 1898. He worked on a farm during his early life and attended the public schools at Utica. Subsequently he became a proofreader in a newspaper office and in 1881 was chosen as editor of the Albany *Journal.* In 1884 he went to England as correspondent of the New York *Times* and resided there until his death. His writings treat largely of rural life in central New York and with the middle class of America. In 1891 he published "The New Exodus," a study of the Jews in Russia. Among his books are "The Lawton Girl," "Seth's Brother's Wife," "In the Valley," and "The Damnation of Theron Ware."

FREDERICK (frĕd'ĕr-ĭk), a city in Maryland, county seat of Frederick county, 32 miles northwest of Washington, D. C. It is on the Pennsylvania and the Baltimore and Ohio railroads. The surrounding country is agricultural and contains rich deposits of iron, copper, slate, and limestone. It is the seat of a fine school system, Frederick College, and a State asylum for the deaf and dumb. Among the noteworthy buildings are the county courthouse, the Emergency Hospital, and the public library. It has manufactures of flour, coaches, tobacco and cigars, machinery, and woolen goods. The public utilities include waterworks, sewerage, and street paving of stone and macadam. The two battles of South Mountain and Monocacy occurred near the city. Francis S. Key was a native of the county and is buried in Mount Olivet Cemetery. Frederick was settled in 1745 and incorporated in 1817. The first Methodist church in America was organized here by Robert Strawbridge in 1764. Population, 1900, 9,296; in 1910, 10,411

FREDERICK I., Holy Roman Emperor, surnamed Barbarossa, born in 1121; died June 10, 1190. He was the son of Frederick II., Duke of Swabia, succeeded his father as Duke of Swabia in 1147, and secured the imperial crown in 1152 as successor to his uncle, Emperor Conrad III. His long reign was distinguished principally by a series of wars against the Italian principalities and other neighboring powers and various complications with the Pope. In 1162 he conquered Milan and five year later laid siege to Rome, but his army sustained a marked defeat at Legnano in 1176. He immediately recruited his army and turned his attention to conquering vassals in Germany and crushing the wealthy Guelphs. Later he made Poland tributary and reduced Bohemia, Austria, and Denmark. Having made himself master of Western Europe, he invaded Asia Minor and defeated the Mohammedans in several battles at Iconium and Philomelium, but on Jan. 10, 1190, was drowned in the Calycadnus, a small river in Cilicia. His sudden death had a depressing influence upon the Crusaders and excited profound grief in Germany, where his memory has always been cherished as one of the wisest and bravest of the nation. He enacted admirable laws, patronized learning, built valuable internal improvements, and solidified the spirit of nationalism in his dominion.

FREDERICK I., first King of Prussia, third Elector of Brandenburg, born in Königsberg, July 22, 1657; died Feb. 25, 1713. He was crowned at Königsberg on Jan. 18, 1701.

Shortly after he sent an army of 20,000 men to take part in the Spanish Succession War, of which a portion served with distinction at the Battle of Blenheim. He wielded much influence by placing auxiliary forces at the disposal of friendly adjacent princes, and assisted the Duke of Orange in his expedition against England to secure the throne. Internal affairs were greatly improved by the founding of institutions of learning, among them the University of Halle, and the encouragement of arts and sciences. He pursued the policy of his father, Frederick William, elector of Brandenburg, in defending Protestantism.

FREDERICK II., King of Prussia, known as Frederick the Great, born in Berlin, Jan. 24, 1712; died Aug. 17, 1786. His early education was devised by his father and consisted of an extremely rigorous course intended to harden him for the conduct and life of a soldier. He married Princess Elizabeth Christina of Brunswick in 1733, and became king on May 31, 1740. He maintained the governmental forms established by his father, but possessed greater liberality and ruled with a spirit of enlightenment. Charles VI. of Austria died the year that Frederick ascended the throne, and the latter at once began extensive military preparations for the purpose of taking possession of Silesia. He invaded that province with an army of 30,000 men, defeated the Austrians at Mollwitz in 1741 and near Czaslau in 1742, and by the Treaty of Breslau secured Glatz and Upper and Lower Silesia. The opposition of Maria Theresa, Queen of Austria, led to a second war in 1744, which terminated by the Peace of Dresden, in 1745, and assured the permanent possession of Silesia. By these successes Frederick raised himself to the height of power as a sovereign of his time.



FREDERICK THE GREAT.

After eleven years of peace, in 1756, the Seven Years' War began, for which he had made an alliance with England and was opposed by France, Austria, Russia, Sweden, and Saxony. Though the fortunes of war were against him in several minor engagements, he was generally successful, defeating the opposing armies in numerous decisive battles, and by the Treaty of Hubertsburg, in 1763, confirmed his title to Silesia. To recover from the terrible ravages of war he melted the silver in his palaces into money, encouraged internal industries, and soon paved the way for an era of prosperity. In 1764 he concluded an alliance with Russia, adding Polish Prussia and Great Poland to his possessions, strengthened the army, and by continual economy accumulated the immense sum of 70,000,000 *thalers*. His chief trust was in his treasury and in his army. Having provided the former, he organized the latter by securing 200,000 sturdy men, disciplined with the greatest strictness under his own supervision. His death occurred from an exposure at a military review. When viewed in the light of sagacity, energy, and enlightenment, history recognizes in him one of the greatest figures of modern times.

FREDERICK I., Emperor of Germany, Frederick III. of Prussia, son of William I., born in Potsdam, Oct. 13, 1831; died June 15, 1888. He studied at Bonn, and secured military training under von Moltke, and took an efficient part in suppressing the revolution in 1848. In 1857 he married Victoria Adelaide, eldest daughter of Queen Victoria of England. During the war with Austria, in 1866, he was a prominent leader, and had personal command of an important position in the Battle of Sadowa. He commanded the army corps that invaded Lorraine and Alsace in the Franco-German War of 1870-71, was made field marshal general and, after the organization of the new empire, assisted his father in the administration. Later he traveled in foreign countries, studied the civil and political institutions of Eurasia, and on March 9, 1888, succeeded his father as Emperor of Germany. Though having a profound military training, he was an ardent advocate of peace, which made him universally popular. In 1887 he became afflicted with throat trouble and underwent a critical surgical operation. He died three months after ascending the throne.

FREDERICK II., King of Sicily, born near Ancona, Italy, Dec. 26, 1194; died in 1250. He was a grandson of Frederick I. of Germany and of Emperor Henry VII., and was under the guardianship of Pope Innocent III. until 1208. In the latter year he assumed the government of Sicily and the southern part of Italy. In 1212 he began a contest for the throne of Germany, in which he was supported by the Pope, but he did not succeed until Otho IV. was defeated by Philip Augustus of France in the Battle of Bouvines. He was crowned Holy Roman Emperor in 1215, when he took a vow to undertake a crusade, but he did not start upon his mission to Asia until 1227. The following year he concluded a truce with the Sultan of Egypt, who surrendered the territory around Jerusalem and Nazareth and recognized Frederick as King of Jerusalem. On returning to Italy, he conducted a military campaign to subdue Lombardy, and sought to limit the powers of the Pope in temporal affairs. He was noted for his learning and talents as a minnesinger and did much to fur-

ther interest in commerce and agriculture. However, he impoverished Germany by costly and useless wars.

FREDERICK VIII., King of Denmark, eldest son of Christian IX., born June 3, 1843; died May 14, 1912. He studied at Oxford, England, and in 1869 married Princess Luise of Sweden, a niece of Oscar II. The eldest of their eight children, Prince Christian, is the Crown Prince of Denmark. Their second son, Prince Karl, became King of Norway in 1905 with the title of Haakon VII. Frederick VIII. ascended the throne of Denmark as successor to his father on Jan. 29, 1906. He administered the affairs of the kingdom with sagacity. His son, Christian X., succeeded him.



FREDERICK VIII.

FREDERICK CHARLES NICHOLAS, noted soldier and field marshal, born in Berlin, Germany, March 20, 1828; died June 15, 1885. He was a nephew of Emperor William I., secured a strict military training, served in the first Schleswig-Holstein War, and defeated the Austrians in 1866 at Königgratz. In 1870 he drove Bazaine into Metz, and on Oct. 27, 1870, received the surrender of the fortress together with 180,000 men. Later he captured Orleans, defeated General Chanzy at Le Mans, and destroyed the army of the Loire. After the close of the war he became inspector of cavalry in Prussia. In 1879 his daughter, Louise Margaret, married a son of Queen Victoria, the Duke of Connaught. He ranks as an efficient commander and strategist, and was called "Red Prince," from the color of the red hussar uniform that he usually wore.

FREDERICKSBURG, a city in Spottsylvania County, Virginia, about sixty miles north of Richmond, on the Richmond, Fredericksburg and Potomac and the Potomac, Fredericksburg and Piedmont railroads. It is surrounded by a hilly but productive country. The site is on the Rappahannock River, which is crossed by several bridges, and is noted for its beautiful Confederate and Federal cemeteries. It has a public park, a fine high school, and a library. The manufactures include cigars, leather, flour, silk and woolen goods, and machinery. It was incorporated in 1782. Population, 1900, 5,068; in 1910, 5,874.

FREDERICKSBURG, Battle of, one of the important battles of the Civil War. It occurred at Fredericksburg, Virginia, on Dec. 13, 1862. General Burnside had resolved to march upon Richmond, and, accordingly, moved his troops to the heights opposite Fredericksburg, on the north side of the Rappahannock. His army consisted of 125,000 men, the right wing of which was commanded by Sumner, the center by Hooker, and the left by Franklin. The army under General Lee numbered 80,000 men, with Jackson as commander of the right wing and Longstreet of the left. The Federal forces crossed the river by three pontoon bridges in the two days preceeding the battle. It was planned that Burnside should make the chief attack and hold the road, while Sumner and Hooker should carry the stone wall which ran along the foot of the hill and ultimately storm the heights. An insufficient number of troops had been assigned to Franklin to effect the object intended. The attacks made by Hooker and Sumner were unsuccessful, but failed largely for want of support from Franklin. The Confederate loss was 5,250, while the Union army lost 12,350, and the entire battle proved disastrous to the Federals. Two days later Burnside withdrew from Fredericksburg, and he and Franklin were relieved of their commands shortly after. General Hooker was appointed to succeed Burnside in command of the Army of the Potomac.

FREDERICK WILLIAM, Elector of Brandenburg, born in Berlin, Feb. 16, 1620; died May 9, 1688. He, next to Frederick the Great, was the chief founder of Prussian power and is known as the Great Elector. He ascended the throne at a time when the treasury was empty and the country devastated by the Thirty Years' War, but immediately pursued a vigorous policy in replenishing the treasury. After making a treaty of neutrality with Sweden, he successfully maintained the independence of Prussia and strengthened the means of national defense. In 1675 he drove the Swedes from Pomerania and Brandenburg, after defeating them at Fehrbellin, and otherwise extended and strengthened his dominion. Frederick III., his son, succeeded him and afterward became Frederick I. of Prussia.

FREDERICK WILLIAM I., King of Prussia, son of Frederick I., born in Berlin, Aug. 15, 1688; died May 31, 1740. He was imbued with a passion for military achievement, but gave evidence of much sagacity and devotion to the improvement of his country. In 1715 he added the islands of Usedom, Wollin, Stettin, and a part of Swedish Pomerania, which he secured as a partial war indemnity from Charles XII. of Sweden. The succeeding years of his reign were devoted entirely to internal improvements, higher learning, and the administration of justice. Schools, colleges of industry, and other centers of learning were established and an effective army was organized. At the time of his death Prussia possessed the best disciplined army of Europe, which num-

bered 80,000 men, and the largest national deposit of cash, a sum equal to $6,750,000. He was succeeded by his son, Frederick the Great.

FREDERICK WILLIAM II., King of Prussia, nephew of Frederick the Great, born Sept. 25, 1744; died Nov. 16, 1797. His reign was distinguished by favoritism, extravagance in public expenditure, strict censorship of the press, and abridgment of clerical powers. In 1794 he enlarged the kingdom by annexing a portion of Poland. The total amount of territory added by him through conquest, purchase, and inheritance included 46,000 square miles. Under his direction the code of laws prepared by Frederick the Great was revised and introduced.

FREDERICK WILLIAM III., King of Prussia, eldest son of Frederick William II., born Aug. 3, 1770; died June 7, 1840. He married Princess Louisa, daughter of the Duke of Mecklenburg-Strelitz, who possessed lofty impulses and aided him in many national enterprises. Upon ascending the throne, he surrounded himself with capable ministers and removed the principal causes for grievance instituted by his father. He was required to surrender some territory to Napoleon in 1801, but secured Hanover in return. Afterward he was compelled to form an alliance with France, though this terminated shortly after the return of Napoleon from Moscow, and later he gained advantage by the battles at Leipzig and Waterloo. After the conclusion of a long series of wars, he labored sincerely to restore prosperity, and brought about some constitutional reforms in the government.

FREDERICK WILLIAM IV., King of Prussia, son of Frederick William III., born Oct. 15, 1795; died Jan. 2, 1861. He married Princess Elizabeth of Bavaria in 1823, but left no issue. His opposition to the new constitution established by his father was a direct cause of the revolution of 1848. The following year he was offered the title of emperor, but declined it. Shortly after he summoned a national parliament at Erfurt for the purpose of uniting the German states under a new constitution, which finally resulted in the establishment of a representative parliament. Through it the German states were solidified and a spirit of nationalism developed. A stroke of paralysis, which affected him in 1857, largely clouded his mind and led to the appointment of his brother William as regent on Oct. 7, 1858, who afterward became his successor as William I.

FREDERICTON (frĕd'ĕr-ĭk-tŭn), a city of Canada, capital of New Brunswick and of York County, on the Canada Eastern, the Canadian Pacific, and other railways. It is located on the Saint John River, 60 miles northwest of Saint John, 84 miles from the Bay of Fundy. It has broad and well-improved streets and is important as a commercial and manufacturing center. The chief architectural structures include a hospital, the legislative library, a customhouse, several schools, and the Parliament buildings. It is the seat of an Anglican bishopric and of the New Brunswick University. Among the manufactures are lumber products, leather, machinery, and boots and shoes. The domestic and foreign trade is important, owing to its convenient location on railways and on the Saint John River, which is navigable for large vessels to this point. It was founded as Saint Anne in 1740. The name was changed to Fredericton in 1785, and two years later it became the capital of New Brunswick. Population, 1911, 7,208.

FREDONIA (frē-dō'nĭ-à), a town of New York, in Chautauqua County, 45 miles southwest of Buffalo, on the Dunkirk, Allegheny Valley and Pittsburg Railroad. It is the seat of a State normal school. Among the enterprises are machine shops, canneries, nurseries, and an electric light plant. It has a public library, waterworks, and several fine schools. The first settlement in its vicinity was made in 1803 and it was incorporated in 1829. Population, 1905, 5,148; in 1910, 5,285.

FREE CHURCH, the general name of a religious denomination which originated from an established church. The most important are the Free Church of England and the Free Church of Scotland. The former is a Protestant Episcopal organization founded in 1844. While the ritual is practically identical with that of the national church, it is free from state control, and claims the liberty of establishing a liturgical service on an evangelical basis. The Free Church of Scotland became a separate body in 1843, when it organized as a branch of the Presbyterian church, as distinct from the Established Church. The separation was brought about by a law of the general assembly passed in 1834, which provided that a majority of the male heads of families, who were full members of the church, could veto or bar the appointment of a minister who was not acceptable to a parish church. This act of legislation caused a conflict between the civil and ecclesiastical powers, but the House of Lords, in 1839, set aside a decision of the civil courts which had annulled the act, hence a large number of members, under the leadership of Chalmers and Candlish, established the Free Church of Scotland. While it renounced the benefits of establishment, it maintains the doctrine and discipline of the Church of Scotland.

FREE CITIES, a name applied to cities that form independent governments or states by themselves. At the time of the French Revolution there were about fifty free cities in Europe, mostly members of the German Confederation, but at present there are only three, the cities of Lübeck, Bremen, and Hamburg, and they retain their privileges under the re-

constituted German Empire. All others lost their special privileges on account of international political changes.

FREEDMEN'S BUREAU (frēd'mẹnz bū'rō), formerly a branch of the War Department of the United States, organized by an act of Congress in 1865 with the view of providing for the needs of liberated slaves, and to aid in fitting them to become self-supporting citizens. Gen. O. O. Howard was appointed commissioner. The bureau was discontinued in 1870. In the five years of its existence it handled a fund of nearly $20,000,000, which was raised by grants, bounties, and prizes, and gave valuable assistance to the freedmen during temporary need.

FREELAND (frē'lạnd), a borough of Pennsylvania, in Luzerne County, 38 miles south of Wilkesbarre, on the Lehigh Valley Railroad. It is surrounded by a farming and anthracite coal mining region. The manufactures include hardware, machinery, cigars, and clothing. It has a growing market in merchandise, coal, and produce. Population, 1910, 6,197.

FREEMAN, Edward Augustus, educator and historian, born in Harborne, England, Aug. 2, 1823; died in Alicante, Spain, March 16, 1892. He was educated at Trinity College, Oxford, and became a fellow there in 1845. In 1857-58 he was examiner in the School of Law and Modern History and again in 1863-64, and was appointed to a similar position in the School of Modern History in 1873. Subsequently many honorary degrees were granted him, among them one each by the University of Cambridge and the University of Saint Petersburg. His work in history, both as a writer and teacher, was distinguished on account of its searching and accurate characteristics, and for the extensive manner of treatment of various themes. His writings include works on architectural history and parliamentary subjects. They were published both as contributions to periodicals and in book form. Among his best known works are "The History of the Norman Conquest," "Historical Geography of Europe," "Ottoman's Power in Europe," "A History of Architecture," "Some Impressions of the United States," "Lectures to American Audiences," "Travels in Greece and Italy," and "Greater Greece and Greater Britain." His writings on American subjects were published after he traveled in Canada and the United States, in 1881-82.

FREEMAN, James, clergyman, born in Charlestown, Mass., April 22, 1759; died in Newton, Mass., Nov. 14, 1835. His training was in the Episcopalian Church, but he afterward adopted Unitarian tenets. In 1777 he graduated at Harvard, organized the first Unitarian society of America, and preached in the Episcopal church in Boston, which subsequently became the first Unitarian church in New England. His work spread rapidly to many portions of the United States. Harvard conferred upon him the degree of doctor of divinity in 1811, and later he became a founder of the Massachusetts Historical Society. His most important work is entitled "Sermons and Charges."

FREEMAN, Mary Eleanor Wilkins, novelist, born at Randolph, Mass., in 1862. She was educated at Brattleboro, Vt., and at Mount Holyoke Seminary. In 1887 she published "A Humble Romance," in which she portrayed much ability in delineating New England characters. She was awarded a prize, in 1895, for writing the best story of less than 6,000 words, although 3,000 competitors took part in the contest. In 1902 she married Charles M. Freeman and took up her residence at Metuchen, N. J. Among her chief writings are "Young Lucretia," "A New England Nun," "The Love of Parson Lord," "The Portion of Labor," "The Wind in the Rose Bush," "Silence and Other Stories," and "The Jamesons, and People of Our Neighborhood."

FREEMASON (frē'mā-s'n), a member of a secret fraternity known as the Freemasons, which dates from the Middle Ages. Originally membership was limited to skilled artisans, but now it includes a far wider range, and the fraternity has branches and lodges in all civilized countries. The present form of organization was adopted in 1717, when the fraternity was reorganized on the avowed principles of charity, brotherly love, and mutual assistance. According to the legends of the craft, it is traced back through the centuries to the building of Solomon's temple, and according to some to the tower of Babel and the building of Noah's ark. Many interesting details are given as to its early organization. Its slow but steady development is traced from the times of Solomon, Hiram, King of Tyre (II Samuel v., 11), the Pharaohs, the ancient Roman nation, and lastly the Knights Templar.

The modern fraternity of Freemasons has its true source in the building corporations maintained in the mediaeval period, when members of those organizations passed to different portions of Europe to hew stone and construct massive and durable forms of architecture. Certain signs and passwords were used by the skilled workmen, which served as a sign of fraternity, efficiency, and worthiness, such signs being kept a secret among the craft. The most distinct types of production by the stonemasons are found in the monasteries and other massive edifices of Germany. In England they date from 926, when a conference of masons was held at York, attended by King Athelstan. In the 12th century they proceeded to Scotland, of which fact many massive abbeys give evidence. The reorganization of 1717 occurred at London, while branches were established in France in 1725; America, in 1730; Russia, in 1731; Germany, in 1740; and later

in all civilized countries. From the first branch lodge established in New Jersey sprang many thousands of others, until at present there are sixty grand lodges in the United States and British America, about 12,000 subordinate lodges, and a membership of 1,198,845.

Findel's "History of Freemasonry," translated into the English in 1889, is the most scientific and complete work on the subject of Freemasonry. It contains an intensely interesting account of the growth and development of the fraternity. At various times, like other secret societies, it has been declared useless and harmful by divers religious councils. In the United States and elsewhere there are numerous degrees, to which applicants are initiated under a system of instruction and tests.

The election of new members is by ballot and various signs, passwords, and grips are given, by which members in need of assistance and succor may be tested before more than ordinary or usual benefits are extended. The grand and subordinate lodges elect officers by ballot, who are eligible to reëlection. Careful study of a suitable course is incumbent upon the members and officers, in order to secure the greatest degree of efficiency and skill in conducting the business appertaining to the fraternity.

FREE METHODISTS, a Protestant sect organized at Pekin, N. Y., in 1860. It is an outgrowth of the Methodist Episcopal church, and was formed by the followers of two ministers who did not approve of the decisions of a conference held at Genesee, N. Y., on points of Christian practice. In the main Free Methodists agree with the Methodist Episcopal church on points of doctrine. They do not recognize the office of bishop, but instead have an elective superintendent, who serves four years. The singing in churches is strictly congregational, without instrumental music, and the seats in the church are free. They insist upon plainness of dress and simplicity in living, approve of and practice freeness in prayer and testimonial meetings, and encourage extemporaneous preaching. The doctrine of Christian perfection is insisted upon. The church has about 32,500 members, 1,200 church buildings, and promotes religious work through Sunday schools and protracted meetings. Missions are maintained in all the continents. The *Free Methodist,* published in Chicago, is one of the leading church journals.

FREEPORT (frē'pôrt), a city and the county seat of Stephenson County, Illinois, 108 miles northwest of Chicago, on the Pecatonica River. It is on the Illinois Central, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads, and has communication by electric railways. The chief buildings are the courthouse, the public library, and the Saint Francis Hospital. Besides having a fine public school system, it is the seat of Freeport College, a Presbyterian institution founded in 1872. Among the manufactured products are carriages, flour, bicycles, farm machinery, vinegar, hardware, and cigars. Douglas and Lincoln had a noted debate at Freeport in 1858, when the former declared a doctrine regarding Dred Scott case which afterward became known as the *Freeport heresy.* The vicinity was settled in 1835 and Freeport was chartered as a city in 1885. Population, 1910, 17,567.

FREE PORTS, a name applied to ports at whose wharves vessels of all nations are permitted to load, reload, or unload free of commercial charges and customs duties, paying only a nominal harbor fee. Free ports were established in the Middle Ages for the purpose of attracting trade to certain cities, and these enjoyed special advantages when prohibitive or protective customs went into effect in other commercial centers. Since 1888 the free port cities have become greatly limited, among the few remaining in Europe being Hamburg, Bremen, and Trieste. Those not European include Hongkong, Singapore, Livingstone, in Guatemala, and several others.

FREE-SOIL PARTY, a political party of the United States, organized at Buffalo, N. Y., in 1848. It maintained an opposition to the extension of slavery as its cardinal principle. At first it was made up of different minor parties, such as the Barnburners, Liberty party, Whigs, and Abolition party. The first candidate for President of the Free-Soil party was Martin Van Buren and its last was John P. Hale, the former in 1848 and the latter in 1852. As neither candidate received a considerable number of votes, the party was merged into the newly formed Republican party in 1856.

FREETHINKERS (frē'thĭnk-ẽrz), a term originated in England and applied to a class of deists in the 17th and 18th centuries, who held tenets in favor of natural as against revealed religion. In the time of Frederick the Great the term began to be used in Germany. In France it was applied to such writers as Diderot, Voltaire, and Helvetius, and in England it had reference to a class which included Hume and Lord Bolingbroke. At present the term is common among Christians as well as others, since it is taken to designate rationalism.

FREETOWN, a city of West Africa, capital of the British colony of Sierra Leone, about five miles from the Atlantic coast. It is located on the Sierra Leone River, 32 miles by rail from Songotown, and is surrounded by a low tract, which is separated from the inland by a chain of mountains. The chief buildings include a mission house, a supreme court, a cathedral, and a number of schools. It is an imperial coaling station and has a large export trade in palm oil, hides, India rubber, and fruits. The city has only about 200 European inhabitants. Population, 1918, 38,063.

FREE TRADE, the term applied to national

and interstate commerce when it is unrestricted by tariffs or customs. Advocates of this system hold that commerce among the nations should be as unrestricted as the trade among the various states of the Union, or among the provinces of Canada, though some think that duties should be levied, but only to obtain revenue and without regard to the effect on domestic industries. Among the advantages argued in favor of such a system are that it is the method of nature, by which every individual has a right to buy in the cheapest market and sell in the dearest, and that attempts to check this right result sooner or later in an artificial commercial condition and cause financial disaster. It is held that the right of property implies freedom for every one to do the best he can with his own, so long as he does not infringe on the rights of others, and that protection benefits only a minority of a nation at the expense of a great majority. As to protecting infant industries, it is held by free traders that long experience has demonstrated that individuals benefited by a tariff system continue to advocate taxation for their personal gain, and that the institutions meant to be matured after years of paternal assistance never reach maturity. In 1846 Great Britain made a step toward free trade by opening the ports to the unlimited and untaxed admission of grain, and since then has gradually extended the free list until the commercial policy is practically one of free trade.

No great political party of the United States has yet advocated an absolute system of free trade. The free list has been enlarged greatly by placing on it commodities and raw materials not produced within the country, largely through the advocacy of a policy of *tariffs for revenue* only, thereby making the object rather one of collecting revenue than for the limitation or prohibition of imports. The principle of free trade is in direct opposition to a system of stimulating industry by *bounties* or limiting importation by so-called *protection* or a protective tariff system. It is claimed on one hand that nations like England, consuming more of the principal products than they produce, thrive under a system of free trade, while, on the other hand, the countries producing largely the food and apparel products can be benefited best by a partial free list and limited tariffs, though local conditions largely tend to modify or restrict the particular legislation which is most essential to the common weal. In this respect the experience of Germany, where high tariff rates are maintained, furnishes numerous examples.

FREE WILL, the power to choose between two courses of conduct without external compulsion. The freedom of the will has long been a subject for discussion in theology and psychology. This controversy hinges upon the question whether the will is free to choose, or whether it is limited by various circumstances that make free choice impossible. Those who think the will is not free to act believe that it is influenced beyond control by various conditions and circumstances, that it acts in accordance with the natural law, that it is governed by previous activity and experience, and that these, acting separately or in unison, make free choice between alternatives impossible. On the other hand, it is argued that the will enables man to select for himself his own course of action and put forth force or effort for the execution of the course he has chosen. However, it is necessary to make choices and put forth effort in accordance with the fixed laws of nature. Only when man is conscious that he makes a free choice and acts accordingly, it is possible for him to feel responsible for his actions. According to this view, he may be prevented from executing his volitions by human interference, but in the matter of making the choice he is not subject to limitation.

FREEWILL BAPTISTS, a denomination of evangelical Christians founded by Benjamin Randall (1749-1808). He was a member of the Baptist church in South Burwick, Me., but began to differ from that denomination soon after entering the ministry. In 1780 he founded a new church at New Durham, N. H. The distinctive tenets of the Freewill Baptists are the doctrines of *free salvation* and *open communion,* as opposed to those of *election* and *closed communion.* This denomination is represented by organizations in Canada and the United States and has about 100,000 members. It is strongest in New England. Bates College at Lewiston, Me., is one of its many educational institutions. It has about 1,600 churches and promotes missionary work through Sunday schools and numerous missions

FREEZING (frēz'ing), the changing of a liquid into a solid under the influence of cold. A large body of water cannot be cooled below the temperature of 32° Fahr., since, when brought to that condition, the entire mass changes to ice. During the change from water to ice heat is liberated from the water, the amount being correspondingly greater than any other substance liberates in cooling. Consequently, an equal amount of heat disappears when ice is changed into water. All liquids solidify at a given temperature, known as the *freezing point,* which differs in the different liquids. Thus, water solidifies at 32°; mercury at —39°; sulphuric acid, at —40°; and alcohol, at —203°. The terms *melting point* and *point of fusion* are used interchangeably with the term *freezing point.*

Advantage is taken of the cooling produced by the solution of solids to obtain low temperatures, and freezing mixtures are made by combining solids, or liquids and solids, which, when mixed, dissolve and cause a reduction of temperature. A simple mixture of this kind

consists of 33 parts of common salt and 100 parts of snow, with which a temperature as low as —5.8 Fahr. can be obtained. The most powerful mixture known, which will make alcohol of the consistency of oil or melted wax, is made by dissolving solid carbonic acid, or solid nitrous oxide gas, in sulphuric ether, giving a temperature of —120° to —200° Fahr. When matter passes from a liquid to a gaseous state, heat is again liberated, the degree of cold varying with the rapidity and extent of evaporation. See **Ice.**

FREIBERG (frī'bĕrg), a city of Germany, in the kingdom of Saxony, 35 miles southwest of Dresden. It is situated on the northern slope of the Erzgebirge, and is surrounded by a productive mining country. Commerce is facilitated by important railway and electric railroad lines. The manufactures include woolens, leather, fertilizers, machinery, and clothing. In the districts adjacent to the city are numerous smelters, which utilize the silver, lead, and copper mined in the vicinity. Freiberg is the seat of a gymnasium, a celebrated mining academy, and chemical and assay laboratories. It has a fine Gothic cathedral constructed in 1490, and contains the castle of Freudenstein. Gas and electric lighting, stone and asphalt paving, sewerage, waterworks, and a public library are among the municipal improvements. The city was made a part of Saxony in 1485. Population, 1910, 36,237.

FREIBURG (frī'bŏŏrg), a city of Baden, Germany, on the Dreisam River, 32 miles northeast of Basel. It has several beautiful specimens of Gothic architecture, the most important being the Gothic cathedral, which is built of red sandstone and rivals the noted Minster of Strassburg. This edifice has a tower 380 feet high and is remarkable for lightness and elegance. It was begun in 1122 and completed in 1513. It is the seat of the University of Freiburg, founded in 1457 by the Archduke Albert of Austria. This institution has 1,500 students and a library of 275,000. Other noteworthy buildings include the Ludwigskirche, the Rathaus, the Merchants' Hall, the grand ducal palace, and several theaters and museums. It has manufactures of clothing, potash, tobacco, paper, chicory, textiles, and machinery. Several railroads and electric car lines furnish ample means of communication, while many modern municipal facilities abound, such as telephones and electric lights. Freiburg was founded in 1090 and became a free city in 1120. It has belonged to Baden since 1806. Population, 1910, 83,328.

FREIGHT (frāt), the general name of merchandise in the process of transportation, either on ships or on railway cars. Originally the term was applied to the cargo carried by a vessel, and later it came to be used to designate the price paid to the charterer of a ship for the carriage of goods. Now it is used to describe the goods carried on land as well as on water. The conditions of carriage are usually set forth in a bill of lading, which is issued by the party receiving the freight to the shipper, and is evidence that the goods were received in the proper condition for carriage and delivery at some particular place. See **Carrier.**

FREILIGRATH (frī'lĭg-rät), **Ferdinand,** poet, born at Detmold, Germany, June 17, 1810; died March 18, 1876. He was apprenticed to a grocer, but continued his studies, and began to contribute to local journals. In 1844 he published a work entitled "Confession of Faith," in which he set forth republican ideas, which caused him to be prosecuted and flee to England. He took part in the Revolution of 1848, and was again compelled to leave the country. While in England he became familiar with the writings of Scott, Longfellow, and Shakespeare, and made a number of translations into the German. Among his writings are "New Political and Social Poems," "English Poetry of Recent Times," and "The Revolution." He is the author of numerous popular national songs, including "Hurrah, Germania" and "The Trumpet of Gravelotte."

FRELINGHUYSEN (frē'lĭng-hī-zĕn), **Frederick,** lawyer and soldier, born in Somerset County, N. J., April 13, 1753; died April 13, 1804. He graduated at Princeton in 1870 and entered the practice of law. In 1775 he was a member of Congress and was elected to several succeeding congresses. In the Revolutionary War he rose to the rank of colonel and was afterward promoted to be a major general. In 1793-96 he served as a United States Senator. He had command of the New Jersey militia during the Whisky Insurrection in 1794.

FRELINGHUYSEN, Frederick Theodore, public man, born at Millstone, N. J., Aug. 4, 1817; died May 20, 1885. He was graduated at Rutgers College in 1836, studied law, and began to practice at Newark. In 1849 he became attorney for that city and established a wide reputation as a corporation lawyer. In 1861 he took part in the peace congress at Washington, served as attorney-general of New Jersey in 1861-66, and in the latter year became United States Senator as a Republican. He was prominent in the impeachment proceedings against President Johnson and in 1870 was appointed minister to England, but declined. The following year he was again elected to the United States Senate. He was a member of the electoral commission in the Hayes-Tilden contest. President Arthur made him Secretary of State in 1881 as successor to James G. Blaine.

FREMONT (frē-mŏnt'), a city in Ohio, county seat of Sandusky County, on the Sandusky River, thirty miles southeast of Toledo. It is on the Lake Erie and Western, the Lake Shore and Michigan Southern, and other railroads, and has transportation facilities by elec-

tric railways and by navigation on the Sandusky River, being at the head of river navigation. Among the chief buildings are the county courthouse, the Birchard public library, and the high school. It is the seat of a normal and business college, and has city waterworks and gas and electric lights. The manufactures include flour, boilers, butter and cheese, woolen fabrics, machinery, and vehicles. It was a trading post as early as 1785 and became Fort Stephenson in 1812. The name was changed to Fremont in 1850, in honor of General Fremont. Population, 1900, 8,439; in 1910, 9,939.

FREMONT, a city in Nebraska, county seat of Dodge County, on the Platte River, 35 miles west of Omaha. It is on the Union Pacific and the Chicago and Northwestern railroads. The surrounding country is fertile and noted for its production of cereals and domestic animals. Among the chief buildings are the Fremont Normal School, the courthouse, the public library, and the high school. It has sewerage, electric lighting, graded and paved streets, waterworks, and telephone connections. The manufactures include flour, cigars, woolen goods, ironware, cured meat, machinery, and dairy products. It was settled in 1857 and incorporated in 1871. Population, 1910, 8,718.

FRÉMONT, John Charles, explorer and general, born in Savannah, Ga., Jan. 21, 1813; died July 13, 1890. He graduated at Charleston College in 1830, received an appointment as teacher of mathematics in the navy three years later, and in 1839 was commissioned as lieutenant in the corps of topographical engineers. In 1842 he conducted an extensive geographical survey between the Missouri River and the Pacific Ocean. He was brevetted captain in 1844, explored the great western basin in 1845, including portions of Utah and Nevada, and discovered a pass to the Pacific, which led to the acquisition of California by the United States. Soon after he was court-martialed on a charge of disobedience to superior military officers and found guilty, but the penalty was remitted by President Polk, though a part of the sentence was sustained, which caused Frémont to resign his commission.



JOHN C. FRÉMONT.

In 1848 he organized an expedition to explore the mountains of California, reaching Sacramento in the spring of 1849, and secured a fine tract of valuable mineral land. He was United States Senator from California in 1850-51. In 1855 he removed to New York City, and became the first candidate of the Republican party for President in 1856. When the Civil War began, he was made major general and given command of the western department with headquarters at Saint Louis. Stonewall Jackson outgeneraled Frémont in his campaign, which caused his transfer to Virginia, but this led him to resign and he took no further active part in the war. In 1878-81 he was Governor of Arizona, later practiced law in New York, and at various times was connected with Southern railroad enterprises. In 1841 he married the daughter of Senator Thomas H. Benton of Missouri. Congress placed him on the retired list of the army with the rank of major general in 1890. His services were of inestimable value to the United States, while foreign countries regarded him a benefactor of mankind, a gold medal from the King of Prussia being among the many marks of recognition. He is popularly spoken of as "Pathfinder of the Rocky Mountains." Among his published works are "Memoirs of My Life," "Frémont's Explorations," and "Reports of Exploring Expeditions to the Rocky Mountains."

FRENCH, Alice, novelist, born in Andover, Mass, March 19, 1850. She is better known as Octave Thanet, which is the name she signed to a large number of her writings. Her literary work began in 1878, when she published articles relating to economics and social methods, and later turned attention to short stories of a realistic nature. For some time she resided in Iowa and Arkansas, which afforded opportunities for studying western life and scenes, and she covered a field and touched upon places of interest before unknown in literature. Her numerous works include "Stories of a Western Town," "Knitters in the Sun," "A Book of True Lovers," "The Mortgage on Jeffy," "Otto the Knight," "Adventures in Photography," and "The Bishop's Vagabond."

FRENCH, Daniel Chester, sculptor, born in Exeter, N. H., April 20, 1850. His father, a lawyer, removed to Concord, Mass., in 1867, and gave him the advantage of studying in the Massachusetts Institute of Technology. He opened a studio in Washington, D. C., in 1876, and shortly after visited Europe to study art in Paris and Florence. The earliest of his important works is "The Minute Man of Concord," which he made for the town of Concord, and his group entitled "Peace and War," in Saint Louis, Mo., is a fine production. His relief, "Death of the Sculptor," was exhibited in 1893 at the Columbian Exposition in Chicago, and several of his later productions were at the Louisiana Purchase Exposition. Other productions include "History," "Herodotus" and statues of Rufus Choate, Lewis Cass, General Grant, and Governor Chase of Michigan.

FRENCH, Sir John Denton Pinkstone, noted general, born at Ripple Vale, England,

Sept. 28, 1852. He joined the royal navy in 1866, serving until 1874, when he entered the army. He saw much active service in the Sudan and in South Africa, where, in 1900, he commanded the relief operations at Kimberly and conducted the capture of Pretoria. In 1914 he received the high command of the British armies in France, where he distinguished himself in many engagements.

FRENCH AND INDIAN WARS, the name usually applied to four wars between the French and the English in America. They occurred in the period of exploration and settlement, in the 17th and 18th centuries, and were due in part to conflicting claims in America and partly to divergent interests in Europe. The French had settled chiefly on the Saint Lawrence and Mississippi, and based their claims upon the theory that a settlement at the source of a river gave title to all the basin, while the English held the view that settlement on the Atlantic coast extended their right across the continent to the Pacific. Migration, induced by an expansion of the colonies toward the west, caused the rival claimants to build forts on the frontier, which soon brought on active hostilities.

1. *King William's War,* the first of this series, began in 1689, when William and Mary ascended the throne of England. War was declared between England and France and at once spread to the colonies. Governor Frontenac of Canada, in 1690, sent three expeditions against the English frontiers. These expeditions included many Indians, who killed and scalped a large number of the settlers. Sir William Phipps was sent with a fleet and 1,800 men against Acadia and Port Royal, both of which he captured, but they were retaken by the French in 1691. In 1696 the French took possession of Newfoundland and captured Andover and other points in Massachusetts, but the Treaty of Ryswick, in 1697, ended the war.

2. *Queen Anne's War* began in 1702, when the War of the Spanish Succession commenced in Europe. James Moore of South Carolina, with a force of whites and Indians, destroyed several Spanish settlements in Florida. The French made an attack upon Charlestown in 1706, but were repulsed. A body of Canadians and Indians obtained possession of many points in New England and punished the English severely at Deerfield, and Haverhill, Mass. Three expeditions were sent by the English into Acadia, and the last of these, in 1710, proved successful. In 1713 the war was ended by the Treaty of Utrecht, which ceded Acadia, Newfoundland, and the Hudson Bay territory to England.

3. *King George's War* began in 1744, when the War of the Austrian Succession commenced in Europe. An attack was made by the French upon the northeastern settlement and privateers from Louisbourg, in Cape Breton, harassed the coast of New England. William Pepperell of Maine was sent with a force against Louisbourg, which was captured on June 17, 1745, after a siege of two months. Another expedition was organized against Quebec, but the Treaty of Aix-la-Chapelle terminated the war in 1748. By the terms of this treaty Louisbourg was restored to France, and the territorial conditions remained as they were before the war.

4. The *French and Indian War* was the American phase of the Seven Years' War, and was the final struggle between France and England for the possession of North America. France claimed the region west of the Alleghenies as part of the basins of the Mississippi and the Saint Lawrence, and had about 80,000 whites and the friendship of many Indians. The English had about 1,100,000 white colonists, but their people were divided into thirteen discordant governments. George Washington with a force of Virginian volunteers made an attack upon Great Meadows and was soon after compelled to surrender at Fort Necessity, a strategic point erected to defend the western frontier. In 1755 the English sent an expedition under Braddock against Fort Duquesne (Pittsburg), but they were attacked and completely routed. Other expeditions were made by way of Champlain and Fort Niagara with the view of capturing the French posts near Nova Scotia, but these proved unsuccessful. The English were defeated in all their projects until William Pitt became the head of the ministry in England, in 1757, when a general scheme was formed to conquer America. The following year Wolfe and Amherst captured Louisbourg, Forbes reduced Fort Duquesne, and Bradstreet captured Fort Frontenac. Ticonderoga and Crown Point were captured by Amherst in 1759 and Niagara was taken by Prideaux in the same year. General Wolfe captured Quebec as a result of the Battle upon the Plains of Abraham, in the same year, and the following year Montreal fell, thus completing the conquest of Canada. By the Treaty of Paris, in 1763, France ceded all lands east of the Mississippi to England, and all the lands west of the Mississippi were ceded to Spain, while Spain ceded Florida to England. This war enforced the necessity of union upon the colonists and left Spain as the only rival of England in America.

FRENCH BEAN, a twining annual plant with alternate leaves, whitish flowers, and seeds more or less kidney-shaped. Several species are cultivated, the most common being the *Lima bean.* They are native to the East Indies, whence they were brought to Europe by the French, but are now grown very extensively in all countries.

FRENCH BROAD, a river of the United States, rises in Transylvania County, North Carolina, and flows through that State and

Tennessee. It joins the Holston River four miles above Knoxville, after a course of about 200 miles. The country through which it passes is famed for its scenery, especially from Asheville to the Tennessee border, where many deep and beautiful gorges characterize the banks, some of which are 300 feet high.

FRENCH CONGO (kŏn'gō), a large colonial possession of France in West Africa, bounded on the north by Wadai; east and south by Egyptian Sudan and the Congo Free State; and west by the Atlantic, Kamerun (Cameroon), and Nigeria. It extends north to Lake Tchad and is separated from the Congo Free State largely by the Congo, the Uvangi, and the Welle rivers. The area is estimated at 590,000 square miles. A number of bays and many lagoons diversify the coast. The southeastern part is in the valley of the Congo, which is fertile and well timbered. Among the principal rivers are the Gabun, Sanga, and Ogowai. Although the country is valuable for its minerals and fertility of soil, the climate is unhealthful.

The native inhabitants are chiefly savage, engaging in hunting, fishing, and rude forms of agriculture. Among the exports are caoutchouc, ebony, palm kernels, coffee, redwood, ivory, palm oil, elephants' teeth, and drum opal. The French title to this possession is based on the explorations of M. de Brazza. He obtained concessions from the natives and occupied Gabun, a region along the coast which is now included with the colony. The country possesses valuable timber, fertile soil, and is susceptible to material development. Libreville, on the Gulf of Guinea, is the capital, whence the colonial government is administered under the direction of France. Other cities are Mayumba, Baraka, Lambarene, Brazzaville, and Franceville. Population, 1916, 12,480,000.

FRENCH GUIANA (gē-ä'nà). See **Guiana.**

FRENCH GUINEA (gĭn'ē), a colonial possession of France, on the western coast of Africa, between Sierra Leone and Portuguese Guinea. It extends inland to Senegal and the French territory in the Sudan. The area is about 106,200 square miles. It is largely a mountainous country, but has a favorable climate and valuable forests. The drainage is partly by the Niger and partly toward the west by the Grande. Among the chief productions are live stock, cereals, ivory, palm oil, India rubber gum, and sesame. The region was explored by the Portuguese at an early date, but the French have carried on a trade since 1685 and took possession of the country in 1869. It was made a separate colony in 1890. Konakry, on the island of Tombo, is the capital and chief port. It is connected with the mainland by a bridge. The estimated population, in 1918, was 1,460,500.

FRENCH INDO-CHINA. See **Indo-China.**

FRENCH LANGUAGE. See **France.**

FRENCH REVOLUTION, the political and military contest of France which overthrew the old feudal *régime* and the Bourbon monarchy. It began in 1789 with the meeting of the States-General and ended in 1799 with the establishment of the consulate, of which Napoleon Bonaparte was proclaimed consul for life in 1802. Previous to the Revolution, France was disturbed by a great spirit of unrest, which was intensified by the success of the American Revolution and the weakness of Louis XVI. The distress of the people had increased rapidly and the state of the finances became more desperate. Prominent men and women, who discussed political abuses and their remedies with dangerous fluency, crowded the royal palace and the salons of Paris. The government finally yielded to a general clamor for the reassembling of the States-General, and the election of members for the states took place with indescribable tumult. Meanwhile Paris was flooded with pamphlets upon the absorbing theme, and when the States-General met at Versailles on May 5, 1789, it ended the monarchy and was the immediate cause of the Revolution.

Great pomp was displayed when the States-General convened and much was expected from that body. It first undertook to settle the question of method in voting, which had formerly been by class instead of by poll. Under this plan the clergy and nobles, acting together, had a decided advantage over the third estate, or the commons. Five weeks were spent in useless parleys, when the commons decided to be the national assembly, and proceeded to deliberate upon the affairs of the state without reference to the other bodies. Louis XVI. now suspended the meetings and convened a royal sitting, at which he ordered the members of the States-General to assemble in their respective rooms. The clergy and nobles obeyed, but the commons refused to have the Assembly dissolved and through Mirabeau declared: "We are here by the will of the people, and nothing but the bayonet shall drive us hence." This signaled the loss of the royal authority, and the clergy and nobles joined the third estate.

The royal authority having failed, no resource but submission or the bayonet was open to the king. The first wave of intense excitement passed over the country on July 12, when it was reported that Necker had been dismissed and troops were rapidly collecting at Versailles. Two days later the Bastille was stormed by an immense crowd, and many of the prisoners were murdered and their bleeding heads were borne on pikes along the streets. It was the first scene in the tragedy of the Revolution. Soon after the Assembly abol-

ished all feudal rights and privileges and adopted a Declaration of the Rights of Man, which outlined the leading principles of a limited monarchy based upon a constitution. This was followed by the organization of the National Guard, but the Commune of Paris was fast getting control of the Revolution. A mob of men and women made an attack upon Versailles, where the royal guards were put to death, and the king and queen were required to return to Paris.

Although the king had taken an oath to support the new constitution, his sincerity was under suspicion, since concerted efforts were made by the émigrés (q. v.) to secure assistance from foreign powers as a means to end the Revolution. The king and queen escaped from Paris in 1791, but were arrested at Varennes, about seventy miles from Paris, and were forced to return. In 1791 the National Assembly had declared its members ineligible to reëlection, which body was now succeeded by the Legislative Assembly. This body was made up of three powerful factions; the Girondists, who were republican; the Feuillants, who supported the constitution; and the Mountain, a party that was made up largely of demagogues and anarchists. Louis unwisely dismissed the Feuillant ministry and appointed a Girondist cabinet, and war was soon after declared against the empire by Prussia and Austria.

The campaign against foreign enemies proved a failure, causing the breach between the king and the Assembly to widen. He soon dismissed the Girondist ministry and sought an alliance with friendly princes, but the Jacobins and Girondists instigated an insurrection. On June 20, 1792, a mob made an attack upon the Tuileries, but the leaders were persuaded to disperse the people. The second attack upon the Tuileries took place on Aug. 10, which was sacked and plundered by the frenzied mob. Louis threw himself upon the mercy of the Legislative Assembly, which was compelled by the mob to put him in prison and suspend him from office. On Sept. 20 the National Convention, as the next Assembly was called, met to take up the government. It included some of the most violent revolutionists, such as Danton, Marat, Camille Desmoulins, and Robespierre, and immediately abolished royalty and proclaimed the republic. The extremists finally carried a measure to confiscate the property of the nobles and priests, and promoted a policy favorable to the annexation of Belgium. A German army had previously invaded France, but was defeated by Dumouriez at Valma. Louis was accused of plotting against the liberty of the people, and after a stormy debate was declared guilty and sentenced to die. He asked for a respite of three days, but was refused and executed while the crowd shouted *Vive la Republique!* This aroused the nations of Europe and a concerted organization was affected by Holland, England, Spain, and Germany to strangle the Revolution, which threatened to overthrow the royalties and aristocracies of Europe. The Austrians defeated Dumouriez, who soon after joined the allied camp against the revolutionists.

The government now organized the Committee of Public Safety and France was thrown into the Reign of Terror. The Jacobins, under the lead of Robespierre, ordered the Girondists arrested, and those who escaped were outlawed and pursued with unrelenting vengeance. All the prisons were crowded, some of the most illustrious citizens were condemned, and the guillotine was kept at work in every part of France. Among those executed were Madame Roland, Philippe Egalité, and Queen Marie Antoinette. Lavoisier, the chemist; Bailly, the astronomer; and De Noailles, the marshal of France, were among the many illustrious persons who were hurried to the scaffold. Many churches and convents were plundered, tombs were rifled, Notre Dame was converted into a Temple of Reason, and red caps were worn to indicate that liberty had been enthroned. At length the terrorists were divided and Robespierre, who had been the most conspicuous figure among them, was beheaded on July 28, 1794. The Reign of Terror was now at an end, the Jacobin Club was disorganized, thousands of prisoners were released and the Terrorists were disarmed. Many defenders of the new republic volunteered to protect the frontiers against foreign invasions. The States-General was organized into two houses, the Council of Five Hundred and the Council of the Ancients, the former to propose and the latter to pass or reject laws. Executive power was lodged in a directory of five persons. Napoleon Bonaparte was called to defend the Tuileries. He planted cannon that swept the insurgents as they came within range of his pitiless guns, thus ending the last insurrection of the people.

FRENCH SOMALILAND (sō-mä'lē-lănd), a colonial possession of France in the northeastern part of Africa, bordering on the Gulf of Aden. It is bounded on the north by Eritrea, east by the Gulf of Aden, south by British Somaliland, and west and southwest by Abyssinia. The area is 45,000 square miles. The surface is hilly along the coast and much of the interior is an elevated plateau, ranging about 4,000 feet above sea level. Gold, coffee, ivory, and fruits are exported; and foodstuffs, machinery, tobacco, and cotton and silk textiles are imported. Jibuti, the chief port, is connected with the interior by a railway and is the seat of colonial government. A part of the possession has belonged to France since 1855, when Obok was made a French port. Subsequently the boundary was moved inland and

treaties were made with Italy, England, and Abyssinia in the period of 1887-96, definitely fixing the boundaries. The government is administered by a governor, who is assisted by a general council of six members. Galla and Danakil races constitute the larger portion of the natives. Population, 201,500.

FRENCHTOWN, a village in Michigan, the site of which is now occupied by the town of Monroe, about 22 miles southwest of Detroit. It was the scene of a battle on Jan. 14, 1813, when an American force of 650 men under Colonel Lewis defeated a force of British and Indians under Major Reynolds. A second engagement occurred at the same place on Jan. 22, 1813. The British under Colonel Proctor made an attack upon General Winchester, who now commanded at Frenchtown, and the Americans were compelled to surrender. Many of the latter were massacred by the Indians, hence the affair is sometimes called the Massacre of the Raisin River.

FRENCH WEST AFRICA, a territorial possession of France, including nearly all of the Sahara. It was made a governor generalship on Oct. 17, 1899, and in 1902 was divided into Dahomey, Ivory Coast, Senegal, French Guinea, Senegambia, and the military territory of the Niger. Government authority over all of these possessions is exercised by the governor general of French West Africa, who has his seat at Saint Louis, in Senegal.

FRENEAU (frē-nō'), **Philip,** poet, born in New York City, Jan. 2, 1752; died Dec. 18, 1832. He graduated at Princeton in 1771, where he was associated as a student with James Madison. In 1776 he made a trip to the Danish West Indies and subsequently engaged in writing poetry and prose. He made a mercantile voyage to the West Indies in 1780, when he was taken prisoner by the British, and after his release published his poem "The British Prison-ship." In 1791 he became editor of the *Daily Advertiser* and subsequently of several other newspapers. He was a strong opponent of the Federalist party and a supporter of Jefferson. His writings include "The Rising Glory of America," "The Indian Burying Ground," and "The Wild Honeysuckle." A few of his volumes were published under the pen name of Robert Slender.

FRERE (frēr), **Sir Henry Bartle Edward,** diplomat and administrator, born at Clydach, England, March 29, 1815; died May 29, 1884. He studied at the grammar school in Bath and attended Haileybury College, where he prepared himself for service in India. In 1833 he entered the civil service in Bengal, removed to Sindh in 1856, and served throughout the Sepoy mutiny. He was made governor of Bombay in 1862, serving five years, and became a member of the privy council in 1873. Subsequently he removed to Cape Colony, where he was governor from 1877 until 1880, when he was made high commissioner for British South Africa.

FRÈRE (frâr), **Pierre Édouard,** eminent painter, born in Paris, France, Jan. 10, 1819; died at Écouen, May 23, 1886. He studied in Paris under Paul Delaroche, and exhibited his first productions in 1843 at the Salon. His subjects are largely scenes from domestic life, amusements of children, and portraits, bearing marked traces of purity and grace. A number of his works were exhibited in the galleries of France, while a painting, "Preparing for Church," is in the Corcoran gallery at Washington. Among his other productions are "Boys Going From School," "Orphan's First Prayer," "Little Gourmand," "Girls Going From School," and "The Gleaner Boy."

FRESCO (frĕs'kō), the art of painting with water colors on fresh plaster, or on a wall covered with mortar not entirely dry. The most satisfactory results are obtained when the plaster is laid on as the painting proceeds, since the unhardened fresh plastered walls permit the color to sink and form a more satisfactory surface. It was highly developed as an art by the ancients, and is now generally employed for large pictures on walls and ceilings. Numerous well-preserved frescoes are to be seen in many of the temples. Splendid specimens of ancient frescoes were found in Pompeii, Egypt, India, and Mexico, though the art was not brought to the greatest perfection until the rise of the finer Italian art in the 16th century. Many of the ancient paintings were executed in what is called *fresco secca,* which is quite distinct from genuine fresco, since it is executed on dry walls and ceilings, previously moistened with limewater.

FRESNEL (frâ-nĕl'), **Augustin Jean,** physicist and inventor, born in Broglie, France, May 10, 1788; died near Paris, July 14, 1827. He was educated at Paris, became government engineer to the department of Vendée, and later was superintendent of public works in Paris. In 1814 he turned his attention to the study of the polarization of light, and added much valuable knowledge of its properties to science. His inventions include a system for lighting useful in lighthouses, which is known by his name and is used almost universally. In 1823 he was elected a member of the Academy of Science.

FRESNO (frĕz'nō), a city of California, county seat of Fresno County, about 40 miles north of Tulare Lake and 200 miles southeast of San Francisco. It is on the Southern Pacific and the Atchison, Topeka and Santa Fé railroads. The noteworthy buildings include the Carnegie public library, the Federal building, the county courthouse, and the high school. It has systems of waterworks, electric lighting, pavements and electric street railways. Among the manufactures are flour, furniture,

agricultural implements, ironware, cigars, and wine. The surrounding country is fruit, cereal, sheep, and mineral producing. An abundance of water power is drawn from the falls of the San Joaquin River, about 30 miles distant. Population, 1900, 12,470; in 1910, 24,892.

FREY (frī), or **Freyr,** in Scandinavian mythology, the brother of Freya and the son of Njörd, and regarded the god of pleasure and fruitfulness. He was beloved by men and all the gods, who bestowed many presents upon him. Loki gave him the ship *Skidbladnir,* which always had a fair wind and, though large enough to carry all the gods, it could be folded up and carried in the pocket. A second present from Loki was a swift boar with golden bristles, which could be used in flying through the air or over the land and sea. It is said that Frey fell in love with Gerda, the beautiful daughter of the giant Gymir, and by her was required to forfeit the sword he used in defending the gods. The people of ancient Sweden gave special attention to the worship of Frey.

FREYA (frī'ȧ), or **Freyja,** in Scandinavian mythology, the daughter of Njörd and the wife of the god Odur, for whom she continually shed tears of gold. She was credited with half the heroes who died in battle, since the love of her was a fruitful cause of wars. Her worship was similar to that of Venus among the Greeks and Romans, as she was looked upon as the goddess of love and beauty.

FREYCINET (frȧ-sē-nȧ'), **Charles Louis,** statesman, born in Foix, France, Nov. 14, 1828. He was educated at the École Polytechnique, appointed engineer of the first class in 1864, and became a member of the council in 1870. In 1876 he was elected to the senate and became premier in 1879, but his ministry resigned several times before its final resignation in 1892, though it was longer in power than any other of the present republic. Under his direction the government vigorously suppressed several conspiracies, checked socialism and anarchy, and made republicanism popular in France. In 1878 he was elected a member of the Academy of Science and subsequently an officer of the Legion of Honor. He published several works on mathematics and engineering.

FREYTAG (frī'täg), **Gustav,** noted author, born in Kreuzburg, Germany, July 13, 1816; died May 1, 1895. He studied at Breslau and Berlin, and lectured on German language and literature at the former university from 1839 to 1847. In the meantime he published several editions of poetry and plays. He edited the *Grenzboten* at Leipzig in 1848-70, during a portion of which time he held a court position, and in 1879 settled in Wiesbaden. His poems, novels, and dramas are alike brilliant and realistic, a number of which have been translated into English by Mrs. Malcolm. Among the best known are "Graf Waldemar," "Debit and Credit," "The Lost Manuscript," "Our Ancestors," "Doctor Luther," "Dramatic Technics," and "The Valentine."

FRIAR, a member of a monastic brotherhood, especially one who belongs to such mendicant orders as the Dominicans, Franciscans, Carmelites, and Augustinians. The term is commonly used to distinguish members of modern religious communities in the Roman Catholic church from the older title of monk, which has special reference to the Benedictines and their branches. In reference to the clothing worn, the Dominicans were formerly called *Black Friars;* the Franciscans, *Gray Friars;* and the Carmelites, *Barred Friars.* The monks are generally called friars in Ireland.

FRICTION (frĭk'shŭn), in mechanics, the resistance arising when two or more bodies move while the surfaces are in contact. It is usually classified as *sliding* or *rolling,* the former being exemplified by the sliding of a sled or skate and the latter by the friction of the wheels of a wagon on the ground. All bodies have elevations and depressions, more or less prominent, and the projecting points of one body render movement more difficult by entering the cavities of the other. However, the intensity of friction depends to some extent upon pressure and slightly upon adhesion. Friction is greatest when a body at rest begins to move, thereby making it difficult for a force to displace the body, owing to its inertia being influenced by friction. The inertness is greatest in large and heavy bodies. Oil and other lubricants are used to lessen friction in machinery and instruments. Friction is a retarding force in nature, and gives stability to bodies which otherwise would be easily displaced. Since friction generates heat, it is one of the chief means of developing electricity.

FRIDAY (frī'dȧ), the sixth day of the week, following Thursday and preceding Saturday. It occurs on the same day as the Mohammedan Sabbath and is the day for general fasts and obligation in the Anglican, Greek, and Roman churches. Friday was named from Frigga (q. v.), a Scandinavian goddess.

FRIENDLY ISLANDS, or **Tonga Islands,** an island group in the South Pacific Ocean, about 250 miles southeast of the Fiji Islands. The islands, about 150 in number, are divided into three groups by two narrow channels and have a total area of 390 square miles. Tongatabu, having an area of 125 square miles, is the largest and contains Nukualofa, the capital. About 30 of the islands are inhabited by friendly natives. They are partly of volcanic and partly of coral origin and have a fertile soil. A number of the volcanoes are active, including Tofoa, height 2,785 feet, and Late, height 1,790 feet. Copra, sponges, coffee, wool, and tropical fruits are the chief products.

Manufacturing is in a primitive state, the products including rude machinery, pottery, and wearing apparel used by the natives. Christian missionaries began active work in 1877, since which time the Christian cause has secured many adherents, schools have been established, and a general advance has been made in moral and intellectual development. The government is directed by a native Christian chief and is administered under a constitution, which provided for a representative parliament and a well-established judiciary. European customs, education, machinery, and utensils have been introduced to a large extent. The island group was discovered in 1643 by Tasman. It was visited in 1777 by Captain Cook, who applied the present name. The islands were declared neutral by the Declaration of Berlin in 1886, but Germany, Great Britain, and the United States held special treaties. In 1899, with the assent of Germany and the United States, Great Britain proclaimed a protectorate. Population, 1916, 21,661.

FRIENDS, Society of. See **Quakers.**

FRIGATE (frĭg'ăt), a name applied originally to a class of long vessels common in the Mediterranean, navigated with sails and oars. It is now used to designate warships that have a high speed and great fighting power. Many of the largest men-of-war belong to this class and carry from twenty to forty guns, sometimes more than that number.

FRIGATE BIRD, a tropical web-footed bird, related to the pelican and sometimes called frigate pelican and man-of-war bird. It is so named from its fierce attack upon other birds, especially when they are carrying articles of food. The bill is longer than the head, the tail has twelve large feathers and is forked, and the extent of wing is about seven feet. Birds of this kind have great power of flight and are frequently seen a thousand miles from land. They often fly in flocks so high that they are scarcely visible, but are very awkward in moving about on the land. These birds are common to the intertropical coasts of the Atlantic and Pacific oceans, and are rarely found north of South Carolina.

FRIGGA (frĭg'gȧ), or **Frigg,** the highest goddess of the ancient Scandinavians. She was the daughter of Fjorgyn, the wife of Odin, and the mother of the race of celestial gods. Fulla, the favorite servant and intimate confidant of Frigga, was intrusted with the toilette and most important secrets of her mistress. The names Frigga and Freya are sometimes closely associated, but the latter corresponds to Venus. Friday, the sixth day of the week, was probably named from Frigga.

FRISIANS (frĭzh'ạnz), an ancient German race that dwelt in the northwestern part of Germany, between the Rhine and the Ems. The Romans under Drusus made them tributary, but later they instigated several revolutions on account of Roman oppression. Subsequently their district was reduced to Friesland, but in the 9th century they obtained their independence, which they maintained until 1498, when their history became merged into that of Germany and Holland. They are an industrious people, have a fine literature, and include a number of eminent historians, poets, and scientists. Modern Frisian is usually divided into East and West Frisian, but both branches have been influenced very largely by the German, especially by the *Platt Deutsch.*

FRITH (frĭth), **William Howell,** painter, born near Ripon, England, Jan. 9, 1819. He studied art in Bloomsbury and at the Royal Academy and began to exhibit in 1840. He was made a member of the Royal Academy in 1852. His "Before Dinner at Boswell's Lodgings in Bond Street," exhibited in 1866, sold for $22,500. Among his works are a number of engravings. Queen Victoria purchased his "Life at the Seaside, Ramsgate," which represents a large gathering on a holiday. Other paintings include "The Village Pastor," "Derby Day," "Marriage of the Prince of Wales," "Railway Station," "The Road to Ruin," and "The Private View of the Royal Academy." He died Nov. 2, 1909.

FROBISHER (frŏb'ĭsh-ẽr), **Sir Martin,** famous seaman in the time of Elizabeth, born in Yorkshire, England, about 1535; died in Plymouth, Nov. 7, 1594. He went to sea when a boy, became skilled as a navigator, and was the first Englishman to attempt the discovery of a northwest passage to China. After attaining skill as a navigator, he made three expeditions to Labrador and the Arctic regions for the purpose of finding a passage to India by the northwest, and attempted to found settlements in the region bordering on Hudson Bay. In 1585 he had command of a vessel under Sir Francis Drake in his famous expedition to the West Indies. He commanded squadrons against the Spanish Armada in 1590, capturing numerous ships, and afterward plundered the Spanish vessels sailing to America. In 1594 he assisted Henry IV. of France, taking part in the siege of Crozon, near Brest, where he was mortally wounded and died in Plymouth soon after.

FROBISHER BAY, an inlet on the southeastern coast of Baffin Land, about 20 miles wide and 200 miles long, and marked by precipitous, rocky shores. It is located about midway between Hudson Strait and Cumberland Sound, west of the southern point of Greenland, and at its entrance is Resolution Island. The fisheries are valuable, but the catching season is short on account of extremely cold winters.

FROEBEL (frē'bẹl), **Frederick Wilhelm August,** celebrated reformer and educator, born in Oberweissbach, a village of the Thuringian Forest, Germany, April 21, 1782; died in Marienthal, June 21, 1852. His mother died shortly after his birth and his education devolved upon

his father and uncle, both village pastors. Left largely to himself in the Thurginian Forest, he developed a marked insight into the essential unity of nature's laws by a profound interest in nature studies. After securing a rudimentary education and taking a course in higher work, he engaged partly in teaching and partly in more especially fitting himself for the lofty calling of teaching. Beginning in 1807, he studied at the celebrated institution of Pestalozzi at Yverdon, near Neuchâtel, where he remained two years for the purpose of qualifying himself in exemplifying the educational principles deduced from the instruction of that master teacher. In 1811 he studied in Göttingen and later in Berlin, and in 1813 enlisted in the army. After the Peace of Fontainebleau, in 1814, he returned to Berlin, where he became curator of the museum of mineralogy. Soon after he established a school at Keilhau, where he was assisted by Yangethal and Middendorff in carrying out his advanced views in educational science. Soon after he wrote "Treatise on the Theory of Teaching" and organized a branch school.

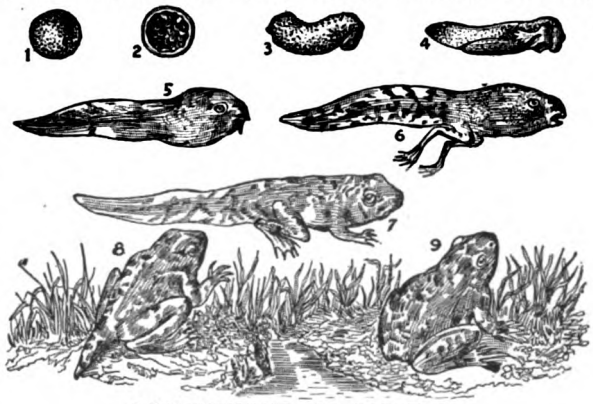


FREDERICK W. A. FROEBEL.

Froebel early recognized the need of trained teachers and began to instruct assistants for the primary work. In 1836 he founded his *Kindergarten*, or "Garden of Children," at Blankenburg, a system of education which has since spread to all civilized nations. The kindergarten system of training beginners as instituted by Froebel is generally popular in Austria, has a widespread foothold in Germany, Italy, Switzerland, and the Netherlands, and is meeting with growing favor in America. Besides his advanced theories for teaching young children in following the course of nature and leading them to grow and expand in accord with natural laws, he influenced the higher education perceptibly, both in theory and application. Among his published works are "Education of Man," "Treatise on Sphericity," "Pedagogics of the Kindergarten," and "Songs for Children." He edited *The Weekly for All Friends of Culture.*

FROG, a tailless amphibian animal which belongs to the leaping *Batrachians.* It has four legs, a flat head, a rounded nose, a very large mouth, and teeth on the upper jaw and palate. The hind legs are very long and stout and the feet are webbed. On the hind feet are five toes, while the front feet have only four. The tongue is thick and fastened in front to the lower jaw so the back part may be thrown out of the mouth very quickly, thus enabling it to catch insects, bugs, and various other forms of life on which it feeds. It swims by means of its hind legs and lives much of the time in the water. However, an adult frog cannot live wholly in the water, having lungs, thus being required to come to the surface at intervals to breathe. In winter it lies burrowed in the mud, and its harsh *croak* may be heard in spring as soon as the sun has loosened the frost.

The female frog lays from 600 to 1,200 eggs, usually in March or April, which consist of a gelatinous mass with minute, black globules. By the end of April they have enlarged and hatched, the young being known as *tadpoles.* The tadpoles breathe by means of gills and have a tail, swimming about like small fish. Their hind legs appear first, later the fore legs, after which they remain dormant and the tail is absorbed, when they are said to "live on their tail." Soon after they quit the water and begin to breathe by lungs instead of gills. The process of breathing is carried on by the action of the muscles of the throat and abdomen.



METAMORPHOSIS OF THE FROG.

1, egg; 2, egg partly incubated; 3, newly hatched tadpole; 4, tadpole with gills; 5, outside gills replaced by internal ones; 6, tadpole with hind limbs; 7, tadpole with four limbs; 8, tadpole with rudimental tail; 9, adult frog.

All species of frogs are destitute of ribs. They make a loud, croaking sound, especially the bullfrog of North America, which grows to a length of fifteen to twenty inches. While frogs are usually green in color, they often have stripes or spots of dark-brown on the back, and the throat is yellow. The eggs of the frogs, like those of fishes, are fertilized after they are laid. Many people consider the hind legs of the American bullfrog excellent food. Several species known as wood frogs live in timber districts, frequenting the trunks and limbs of trees in search of food.

FROHMAN, Charles, theatrical manager, born at Sandusky, O., June 17, 1860; drowned May 7, 1915. He studied in New York City, where he was employed in a newspaper office, and for some time sold tickets at Hooley's Theater, Brooklyn. In 1877 he took charge of a company and traveled in the western states, and for some time was with Haverly's Mastodon Minstrels in America and Europe. He bought rights to play "Shenandoah," with which he made a great financial success. In 1890 he organized the Charles Frohman Stock Company and became proprietor and manager of Madison Square, the Empire Theater, and other theaters of New York City, and conducted the Duke of York Theater in London. He brought out John Drew, Maude Adams, Julia Marlowe, and other well-known star actors.

FROISSART (frois'ärt), **Jean,** poet and historian, born in Valenciennes, France, in 1337; died in Chimay about 1410. The personal history of Froissart is known only from the incidents detailed in his verses and the "Chronicles." It appears that he received a liberal education and was trained for the church, but possessed a passion for poetry and the charms of knightly society. He commenced a history of the wars of his period at the age of twenty. To secure data he traveled to examine the places at which historic battles occurred, that he might detail accurately the events. His line of travel was through France, Great Britain, Germany, Switzerland, Italy, and Spain. The writings based on his travels furnish valuable information regarding the customs and habits of the people and of the more important events connected with the countries visited en route. He made a second visit to England in 1361-66, when he became secretary to the queen, and later was entertained by King David Bruce. His "Chronicles" was edited in his native town, but he returned to England after a lapse of forty years to study newer developments, and again returned home to complete his descriptions by revising and editing. It is certain that he was an interesting story teller, resourceful in securing information and accurate in detailing events. On account of his wit, shrewd observance, and gay poetry he was everywhere honored and welcomed. His "Chronicles" is a valuable work for illustrating the character and manner of his age, and embraces the events occurring from 1326 to 1400. It has been translated into Latin and numerous modern languages. The original manuscript is in the library at Breslau, Germany.

FRONDE (frônd), the name of a political faction in France which headed an insurrectionary movement during the latter part of the minority of Louis XIV. It was so named from *frondeurs,* meaning slingers, since their attacks upon Cardinal Mazarin were said to resemble the act of boys throwing stones with slings. The movement started in 1648, when the Parliament refused to register certain objectionable royal edicts that followed the breaking up of the feudal system, and, when the king compelled that body to register, the people rose in defense of their rights. The struggle continued until 1652, by which time the nobles had won great constitutional reforms, but they had no definite object except selfish profit and were not directed by a strong leader, hence Mazarin regained his former power. As a whole, the War of the Fronde may be classed as a useless political and military contest, since the loss of advantages that had been gained temporarily contributed to make Louis XIV. an absolute monarch.

FRONTENAC (frŏnt'tê-năc), **Louis de Buade,** soldier, born in France about 1622; died Nov. 28, 1698. He entered the military service of France at an early age and took part in active operations in Flanders, Italy, and Germany. Louis XIV. appointed him governor of New France in 1672, as successor to De Courcelles. He built Fort Frontenac, now Kingston, Ont., and sent out the famous expeditions under Joliet, La Salle, and Marquette. In 1682 he was recalled, owing to the opposition of Bishop Laval of Quebec, but was again made governor of Canada in 1689. Shortly after he defeated the Iroquois, destroyed the English fleet in Hudson's Bay, and captured a number of English points in Newfoundland and New England. In 1690, during King William's War, he defeated the English forces before Quebec. Soon after the close of that war he conducted a campaign in the Mohawk country, and in 1696 compelled the Iroquois to sue for peace.

FROST (frŏst), the minute crystals of ice formed directly from the vapor of water. At a temperature of 32° Fahr. the watery vapor becomes so cold that it cannot condense into water, but falls to the earth in the shape of frost instead of dew. This is known as *white* or *hoar frost.* The name is often applied to moisture hardened by cold after it has fallen in the form of dew, or to the inside of window panes in a warm room. Frost is very destructive to plants, as the water in the juices expands when it freezes and thereby bursts the vesicles. Clouds and smoke act as a covering to check radiation. Winds bring fresh masses of air into contact with the cold objects and prevent frost, which accounts for dew and frost falling most abundantly at night when there is little movement in the atmosphere. *Black frost* is caused by cold so severe that plants freeze and change color without showing any signs of hoar frost. A *frostbite* is a state of numbness of any part of the body of an animal, but especially of the extremities, by exposure to extreme cold. In like manner plants partially frosted are said to be frost-bitten. Slight frostbites in animals often cause chil-

blains, which are annoying but not very dangerous, but in severe cases gangrene may set in or they may result in permanent injury or even death. Rubbing and applications of snow or cold water are recommended as soon as the injury is discovered.

FROSTBURG (frôst'bûrg), a town of Maryland, in Allegheny County, in the western part of the State, on the Cumberland and Pennsylvania Railroad. The location is on a fine plateau between Dan's and the Savage mountains, about 2,150 feet above the sea, and the surrounding country has extensive coal mines and deposits of fire clay. It is the seat of a State normal school. The manufactures include brick, machinery, clothing, and cigars. Frostburg is popular as a summer resort. Population, 1900, 5,274; in 1910, 6,028.

FROUDE (frōōd), **James Anthony,** historian, born in Dartington, England, Jan. 23, 1818; died Oct. 20, 1894. He studied at Westminster and Oxford and in 1842 was elected as fellow of Exeter College. In 1844 he took deacon's orders, but soon after engaged in literary work by contributing to magazines. He was elected rector of Saint Andrews University in 1869, where he received an honorary degree. In 1874-75 he visited the South African colonies in the interests of the British government, and published a number of reports relative to that section of the world. He possessed a degree of ability that gave his history the fascination of fiction and displayed a supreme literary power, but his historical works are largely impaired by distorted views and unfairness in giving tone to the motives of other nations and peoples. As a versatile and prolific writer he is rivaled only by Macaulay, though his works do not possess the fairness with which that writer treated non-British institutions. Among his most important productions are "Shadows and Clouds," "History of England from the Life of Woolsey to the Defeat of the Spanish Armada," "Short Stories on Great Subjects," "Two Lectures on South Africa," "Life of Lord Beaconsfield," "Life and Letters of Erasmus," "Divorce of Catharine of Aragon," and "The English in Ireland in the Eighteenth Century."

FRUIT (frut), in botany, a mature ovary of a plant, which contains the seeds, especially such plant products as are pleasant to the taste and eaten by man and animals. Other parts of the flower, most frequently the calyx, sometimes remain after the flowering is over, undergo a further development, and form part of the fruit. All that is external to the seed in ripe fruit is called the *pericarp* and is the edible portion, except in such berries as grapes, gooseberries, and others, whose pulpy matter is formed from the placentas of the seeds. The value of fruit to man exceeds that of all other parts of plants. Among the more important fruits in the temperate climates are apples, peaches, plums, cherries, melons, apricots, mulberries, strawberries, raspberries, and others, while with those of the warmer regions may be included the dates, olives, figs, grapes, oranges, bananas, nuts, etc. Fruit is grown very extensively for the market, both in Canada and the United States, although the latter country has a wider range of climate and produces a greater number of species than Canada. See **Horticulture.**

FRY, Elizabeth Gurney, philanthropist, called "The Female Howard," born in Norwich, England, May 21, 1780; died Oct. 12, 1845. She was converted by the efforts of William Savery and joined the Society of Friends. Soon after she organized a school for poor children, at which eighty attended, and in 1800 married Joseph Fry, a merchant of London. In 1813 she devoted her energy to the betterment of the female prison at Newgate, preached the gospel, and with her brother visited the prisons of Scotland in 1818 and of Ireland in 1827. The House of Commons acted upon her suggestions by establishing departments of instruction and manufacturing in the prisons and made provision for giving religious aid to convicts. She made an extended visit to France in 1838, traveled through Germany, Belgium, and Holland in 1840, and the following year visited Copenhagen. A monument was erected to her memory in London.

FRYE, William Pierce, statesman, born in Lewiston, Maine, Sept. 2, 1831. He studied at Bowdoin College, was admitted to the practice of law, and in 1861 and 1867 was elected to the State Legislature. In 1867-69 he was attorney-general of Maine, served as representative in Congress twelve years consecutively, and was appointed to fill a vacancy in the United States Senate occasioned by the resignation of J. G. Blaine, taking his seat in 1881. Subsequently he was reëlected for several consecutive terms, serving his constituents in a prominent and effective manner. In 1896 he was elected president *pro tempore* of the Senate, and in 1898 was appointed by President McKinley as one of a committee of five to negotiate a treaty of peace with Spain. He was granted degrees by Bowdoin and Bates colleges and served as a trustee of the former institution. In 1906 he was reëlected to the United States Senate for the term which expired in 1913. He died Aug. 8, 1911.

FUCA, Juan de (hŏŏ-ăn' dā fōō'kà), a strait between the United States and British America, separating Vancouver Island from the State of Washington. It connects the Pacific Ocean with Puget Sound and the Strait of Georgia, the former lying south and the latter north of its eastern extremity. It is from 15 to 30 miles wide, about 100 miles long, and contains a number of islands. The Strait of Juan de Fuca was so named from Juan de Fuca, a Greek navigator, who discovered it about 1592.

FU-CHOW. See **Foochow.**

FUCHS (fo͝oks), **Leonhard,** botanist, born at Wembdingen, Germany, Jan. 17, 1501; died May 10, 1566. He studied at Ingolstadt and Tübingen and in 1526 began the practice of medicine. In 1535 he was made professor of medicine at Tübingen, where he instructed successfully until his death. His writings treat largely of botany and medicine. The fuchsia, an American plant, bears his name. He is regarded one of the founders of scientific botany.

FUCHSIA (fū'shĭ-ȧ), a genus of flowering shrubs native to Mexico, South America, and New Zealand, and so named from the discoverer, Leonard Fuchs (1501-1566), a German botanist. About seventy species have been described. The calyx is funnel-shaped and four-parted, with the four petals set alternately, the



FUCHSIA.

style is long, and the stigma is capitate. Popularly they are called *ladies' eardrops,* from the appearance of the pendulous flowers. They are favorites as house and garden plants and thrive in a light, rich soil, though growing best in a mixture of loam and peat. New plants may be developed from young cuttings set in sand or loam.

FUEL (fū'ĕl), the material with which a fire is fed, including various forms of carbonaceous matter, such as gaseous, liquid, and solid substances. The phenomenon of heat arises by combining fuel with oxygen, as by combustion, and forms an essential element for manufacturing and domestic purposes. Natural gas, common coal gas, and acetylene gas are used very extensively for heating, lighting, and manufacturing. Among the liquid fuels are alcohol, creosote, petroleum, shale oil, and various vegetable and animal oils. Each of these is employed with success for divers purposes, though petroleum and creosote constitute the principal kinds used in the large manufacturing establishments. Crude petroleum has come into extensive use on locomotives as well as steamboats. Alcohol is a valuable fuel where a small volume of heat, which can be easily regulated, is wanted for small manufacturing enterprises and in experiments. Among the solid fuels are wood, coal, peat, wood charcoal, and coke.

In pioneer settlements and countries destitute of mineral fuel, wood and its products are the principal forms used, though coal and its products constitute by far the most important fuel used in the great centers of manufacture, ocean navigation, railroad operation, and for heating purposes. The extensive natural gas deposits in America and Eurasia are having a marked influence, not only in propelling machinery, but in smelting and refining. Within recent years lighting by electricity has displaced the consumption of fuel for street illumination and largely as material for house lighting, especially in large centers of population. At the present rate at which electricity is coming into use for heating purposes, it is not improbable that some plan will be devised to displace many other forms by this inexhaustible agent.

FUGITIVE SLAVE LAW (fū'jĭ-tĭv), the statutes of the United States which provided for the return of the slaves who escaped from the State in which they were held in servitude. The surrender of slaves that had escaped to another State was a matter of mere comity under the colonial government as well as under the Articles of Confederation. Though the word *slave* is not used in the Constitution of the United States, a clause in Article IV. directs that escaped slaves be returned to their masters. In 1793 the first law of Congress was passed under this provision, and it directed that escaped slaves and criminals be returned. The provision imposing on magistrates of the states certain duties under Federal statutes led to some complications, but an attempt in 1818 to amend it failed. A new and more stringent law was provided by the Compromise of 1850, under which the refusal of the marshal to execute writs under the act subjected him to

a fine. He was made liable for the value of slaves escaping from his custody, and those obstructing an arrest or attempting a rescue were made subject to a fine together with imprisonment. A commissioner who investigated and adjudged the prisoner a slave was allowed a fee of $10.00, but only $5.00 was paid to him, if the person was set free, and the testimony of the person claimed as a slave was never taken. These provisions caused a large number of free Negroes in the North to be kidnapped. Many northern states passed personal liberty laws, by which the breach preceding the Civil War was widened. The fugitive slave laws were not repealed until 1864.

FUJIYAMA (fo͞o-jĭ-yä′mä), or **Fuju-San,** the highest elevation of Japan, situated on the island of Hondo, in the province of Suruga, about 60 miles west of Tokio. Its crater is 500 feet deep. The mountain was active at numerous times prior to 1707, but since then has been dormant. It has an elevation of 12,365 feet above sea level. The Buddhists hold it sacred and wander in large companies to its higher places of interest from July to September, when the snow is melted under the more direct rays of the sun. Many shrines and temples are maintained at different elevations.

FULAH (fo͞o′lä), a race of Negroes native to Africa, found chiefly in the basin of the Senegal River, but distributed more or less widely throughout the Sudan. The color is light brown; the stature, medium; the head, long; the speech, Negroid; and the hair, wooly, but not frizzled. They give evidence of considerable shrewdness and intelligence, and are skilled in manual labor and the manufacture of native clothing and utensils. In the eastern part of the Sudan they are mixed largely with the Ethiopian races.

FULLER (fo͝ol′lẽr), **Melville Weston,** noted jurist, born in Augusta, Me., Feb. 11, 1833. In 1853 he graduated at Bowdoin, studied law at Bangor and Harvard, and was admitted to practice at the bar in 1855. He edited the Augusta *Age* for several years. Besides serving on the common council, he was city attorney. He removed to Chicago in 1856, where he practiced law successfully for more than thirty years. In 1862 he was a member of the Illinois constitutional convention, was elected to the Illinois House of Representatives the following year, and served as a delegate to all the Democratic national conventions from 1864 to 1880. President Cleveland nominated him Chief Justice of the United States Supreme Court in 1888, and he entered upon the duties of that office in October of the same year. He was one of the arbitrators in the Anglo-Venezuelan dispute in 1899. As a judge and jurist he ranks among the most distinguished of America. He died July 4, 1910.



MELVILLE W. FULLER.

FULLER, Sarah Margaret, Marchioness Ossoli, celebrated authoress, born in Cambridgeport, Mass., May 23, 1810; died July 13, 1850. She was the eldest child of Timothy Fuller, a jurist and statesman, learned German, French, Italian, and Spanish, and in 1836 settled in Boston as a teacher of languages. The following year she was chosen principal teacher in one of the schools in Providence, R. I. Besides teaching, she contributed to the New York *Tribune* and other periodicals, and wrote several works of literary value. In 1846 she traveled in Europe, and the following year met Marquis Ossoli in Rome, whose wife she afterward became. In 1848-49 she contributed much to the cause of Italian independence by writing and speaking, and in the latter year had charge of two hospitals during the siege of Rome, while her husband aided the army in defending the city. After the capture of Rome by the French in 1849, she and her husband spent some time in hiding and in 1850 embarked for America. A violent storm drove the vessel on the shoals of Fire Island, near New York, in which they and their infant child perished. The body of the child was found on the beach some time after, but their remains were not recovered.

FULLER, Thomas, clergyman and author, born at Aldwincle, England, in 1608; died Aug. 15, 1661. He graduated at Queen's College, Cambridge, in 1625, and soon after became a divine of the Church of England. In 1631 he was made prebendary of Sarum and later held a number of important charges at different points. During the time of the Commonwealth he sided with the Royalists, and in 1660 was made chaplain to Charles II. His writings include "Church History of Britain," "History of the Holy War," "The Worthies of England," and "Pisgah-sight of Palestine."

FULLER'S EARTH, a kind of greenish-white clay found in many parts of Europe. It is formed chiefly from alumina, with which are mixed lime, silica, and several other ingredients. This clay is much used by manufacturers in cleansing the oil from woolen fabrics, since it is much cheaper than soap.

FULMAR (fo͝ol′mär), a species of aquatic birds belonging to the petrels, native to the island of Saint Kilda and many of the Arctic coasts. These birds are about the size of a domestic duck. They feed on whale blubber, fish, and putrid animal matter. The fulmar is valued for the oil obtained from its stomach and for its feathers and eggs. The natives gather the eggs, considering them excellent as

food. Several species of the fulmar are found in the Pacific Ocean, though they are larger than those native to the Arctic regions.

FULMINATION (fŭl-mĭ-nā'shŭn), the sudden decomposition of bodies by percussion or heat. It is accompanied by light and a loud report. Fulminates or fulminating compounds are explosives formed by preparing fulminic acid with gold, silver, platinum, mercury, or other bases. The percussion caps contain fulminate of mercury, which forms the priming. Fulminating powder is a mixture of niter, sulphur, and potash.

FULTON (fụl'tŭn), a city of New York, in Oswego County, 25 miles northwest of Syracuse, on the New York Central and the Lackawanna railroads. It is located on the Oswego River and the Oswego Canal. A public library, waterworks, electric lighting and pavements are among the public improvements. It has an academy, a hospital, and several fine churches. The manufactures include cutlery, flour, condensed milk, and machinery. The first settlement on its site was made in 1791 and its present charter dates from 1902, when the villages of Fulton and Oswego Falls were united. Population, 1905, 8,847; in 1910, 10,480.

FULTON, Robert, noted engineer, born in Little Britain, Pa., in 1765; died in New York City, Feb. 24, 1815. When seventeen years of age he became a portrait and landscape painter, and five years later studied painting in London under West, but soon after abandoned art and engaged in mechanical pursuits. His desire to study engineering was induced by James Watt, the Earl of Stanhope, and the Duke of Bridgewater, with whom he formed an acquaintance. He secured a patent in 1794 on an inclined plane intended to supersede locks on canals. Later, he invented a dredging machine, a mill for sawing marble, a flax-spinning machine, and a machine for making ropes. He proceeded to Paris in 1797 and successfully introduced a boat propelled by steam, and while there he invented a submarine boat useful in torpedo warfare.



ROBERT FULTON.

Fulton visited Scotland to obtain drawings of a steam vessel, the *Charlotte Dundas,* which had plied on the Forth and Clyde Canal. On his return to America, in 1806, he built the *Clermont,* a steamboat of considerable size. In 1807 he successfully navigated the Hudson River, making a voyage of about 150 miles in 32 hours. Soon after a large number of steamboats were constructed. Though not the first inventor of the steamboat, Fulton caused it to come into general use, and to enter as an important factor in developing the interior parts of the United States. In 1814 he secured several valuable patents on an improved steam warship, which was launched in 1815. Subsequently he turned his attention to improving the submarine torpedo, but died before completing it. He published "Torpedo War," "A Treatise on the Improvement in Canal Navigation," and "Advantages of the Proposed Canal from Lake Erie to the Hudson River."

FUNCHAL (fōōn-shäl'), a city in the island of Madeira, of which it is the capital. It is located west of Morocco and southwest of Gibraltar, and is important as a Spanish coaling station. The chief buildings include an opera house, a cathedral, a museum, and the government building. Its site rises abruptly from the sea, hence many of the streets are narrow and steep, but they are nicely lighted by electricity and improved by grading. The harbor is well fortified and is the only port in Madeira that can be reached by large steamers. Its favorable climate has caused it to be popular as a health resort. Population, 1917, 20,986.

FUNCTION (fŭnk'shŭn), the term applied in the study of animal or vegetable life to designate the specific office or work which any organ or system of organs is intended to perform. The vital functions are those which are necessary to life. In the higher animals they consist of the specific office or work of the heart, brain, and lungs. The functions relating to the external world, such as voluntary motion and the senses, are called animal functions. On the other hand, the processes of assimilation, respiration, absorption, digestion, and expulsion are called natural or vegetative functions.

FUNDY (fŭn'dĭ), **Bay of,** an inlet of the Atlantic, separating Nova Scotia from New Brunswick. It is 165 miles long and has an average width of 35 miles. At its upper extremity it branches into Chignecto Bay and Minas Channel and Basin, which are separated from the Gulf of Saint Lawrence by a narrow isthmus. Navigation is rendered dangerous by tides that rise and fall rapidly from fifteen to seventy feet. Grand Manan and other islands are at the southern entrance. The Saint Croix and Saint John rivers flow into the bay. A ship railway connects Chignecto Bay with Northumberland Strait.

FUNGI (fŭn'jī), a large group of flowerless plants, which, in their different forms, are known as mushroom, toadstool, blight, mold, rust, smut, mildew, and by other appellations. Fungi are closely akin to the lichen, but are a lower order and occur in different situations, chiefly drawing their food from the objects on which they are found. Their structure is cellular and they are propagated by spores. Some species grow in green pastures and others on decaying trees, or on grasses or grains, which they

destroy. Many thrive on books and other objects when they are stored in damp places and some are found on man and animals in certain diseases. Fungi are present wherever decay is going on. Many species grow very rapidly, springing up in a single night and dying as quickly, and some grow very slowly, adding to their main body year by year. Various forms of fungi are so small that they can scarcely be seen, while others measure several feet in circumference. Several species are used for food and some are valuable for medicine.

Fungi occur in all parts of the earth where it is not too cold for vegetable growth, but they are most plentiful in moist, temperate climates. Edible mushrooms, well-known species of fungi, grow wild in Europe and America, and are largely cultivated for food. Some species are grown in great quantities for the market. Truffles are fungi growing under ground like the potato and are used for flavoring sauces and meats. They commonly grow about a foot under ground in loose soil, where they are located by dogs trained to search for them as they do for game. Truffles are about the size of a hen's egg, white or brownish in color, and rough and warty on the outside. They are native to Eurasia, but are grown in America. Mildew, rust, and smut grow on plants and destroy them, and are dreaded by gardeners and farmers. There is scarcely any plant that it entirely free from affection by fungus growths, the condition of climate having much to do with their effect. Mold grows on bread or cheese, while mildew appears under certain conditions on cloth or paper, destroying the fiber.

FUNSTON (fŭn'stŭn), **Frederick,** soldier, born in Ohio, Nov. 9, 1865. His father, Edward H. Funston, removed to Kansas in 1867 and served as a member of Congress for ten years. The son graduated from the Iola high school in 1886, attended the Kansas State University, and in 1893-94 aided in exploring Alaska. He joined a Cuban filibustering expedition in 1896, and two years later become commander of a United States regiment, with which he was ordered to the Philippines, where he aided in capturing Manila. In 1901 he headed a detachment of troops to capture Aguinaldo, whom he took prisoner about 200 miles northeast of Manila on March 23. Previous to this, in 1899, he had been made brigadier general and was awarded a sword for bravery by the State of Kansas. In 1906 he had charge of the military forces at San Francisco, where he displayed much energy in protecting the city at the time of the earthquake and the fire. **He died Feb. 19, 1917.**

FUR, the short, soft coat of hair which covers the skin of many mammals. In some species the fur proper is found next to the skin and under the hairs, which are longer and coarser. Fur, in its usual trade acceptation, is a dressed skin containing the short, fine hairs and from which the long hairs have been pulled. Before it is fit for use, a skin must be thoroughly cleaned, steeped, and scoured in a bath of meal, alum, and salt, after which it is washed in soap and soda, cleaned and dried. Other methods are used to prepare for tanning. Furs are often colored, the fur of the seal being commonly changed from a dirty yellow to a rich brown. Al the chief fur-bearing animals, such as the sable, marten, mink, ermine, beaver, and otter, are treated in special articles, which see. The use of furs or fur pelts for covering the body is coeval with the earliest history of all northern nations or tribes. Subsequently it grew into an article of barter and trade, first among themselves and then with their neighbors of more temperate climes, where it became an article of fashion, ornament, and luxury.

The fur trade, in the early history of America, gave rise to vast commercial ventures on the part of individuals and companies, who operated to facilitate settlement and the discovery of unknown wealth. Russia extended its dominion over Siberia to secure the rich fur trade. Practically the same motive induced the Dutch East India Company to turn its attention to America. The French, after establishing trading posts at Montreal and Quebec and exploring the Great Lakes, battled against England many years to retain possession of the region rich in fur-bearing animals. The Hudson's Bay Company, organized in 1670, had exclusive trade with the Indians nearly 200 years, but the royal grant was taken from it in 1868. Since then there have been private collectors and dealers throughout Canada, who compete in the open market for a share of the trade. This likewise is true of Alaska and other regions which are rich in furs. London and Leipzig are the most important fur markets of the world. The enterprise in the United States, although quite extensive, has been conducted by individuals rather than corporations. The Alaska Fur Company holds two of the Aleutian Islands with exclusive right to kill not to exceed 100,000 fur seals yearly. New York City has the largest fur trade in America.

FURIES (fū'rĭz), in mythology, the deities that avenged for all transgressions, frequently mentioned as the Erinyes or the Eumenides. They were supposed to reside in Tartarus. Their number was generally thought to have been three, known as Alecto, Megaera, and Tisiphone, but Aeschylus and other writers mention many Furies in their tragedies. Virgil and the later poets of Rome introduced the Furies, which were of Greek origin, and attributed to them the habit of maddening the transgressor and thus leading him into further crime as an evidence of their punishment. Many ancients spoke of them as the gracious goddesses, fearing that the term angry goddesses might cause them to be more furious.

FURLONG (fûr'lŏng), meaning furrow-length, an English measure of 40 rods, perches,

or poles, equivalent to one-eighth of a mile, or 220 yards.

FURNACE (fûr'nâs), a chamber in which fuel is burned for the production of heat. The heat generated in such structures is commonly utilized in steam engines, melting ores or metals, warming houses, baking bread, and making pottery. While there are various forms of construction, they should be so built that a perfect combustion of the fuel may be possible, and to apply effectually the greatest possible amount of heat. Unless the plans are carefully made, the heat will dissipate without being concentrated directly on the substance to be acted upon in the process of heating. The constructor must likewise aim to supply means whereby an operator can easily control at pleasure the degree of heat necessary. Furnaces are variously designated according to the draught applied. Those in which the draught is natural are called *air furnaces,* those into which a strong current of air is injected by artificial means are termed *blast furnaces,* and those in which a low arch roof is utilized to turn the flame upon the object against which the heat is to be directed are termed *reverberatory furnaces.*

Several classes of furnaces are in use for heating residences and other buildings, such as hot air, hot water, and gas furnaces. In hot-air furnaces the heat is radiated through large pipes into the apartments to be warmed, while in hot-water systems the pipes are connected with radiators in the different apartments, which are filled with water, and this is induced to circulate by applying the heat to a definite portion of the system, thus causing hot water to pass to the different rooms and the colder to flow back into contact with the heater. Heating by steam requires practically the same kind of apparatus. Gas furnaces are those in which gas is utilized for fuel. They are constructed in a manner that either hot air or hot water can be applied. In electric heating the current is obtained from a dynamo, which is propelled by steam generated through the agency of a furnace, or by water power. The outer framework of an electric heater is commonly of thin cast iron, having projections to radiate the heat. Coils of resistance wire, from which the heat of the electric current radiates, are within the framework. From five to twenty amperes are necessary to produce an equable amount of heat on a three-foot heater, on a 110-volt circuit. The heaters are placed where required, connected by wire, and so constructed that the current may be turned on or off by means of a switch, as in an incandescent lamp.

FURNEAUX ISLANDS (fûr-nō'), a group of islands between Australia and Tasmania, so named from Tobias Furneaux (1735-1781), who discovered them in 1773. They are located at the east end of Bass Strait. Flinders Island, the largest of the group, is 10 miles wide and 35 miles long. Cape Barran Island, the second in size, is separated from Flinders Island by Franklin Strait. These islands, for the purpose of local government, belong to Tasmania.

FURNESS (fûr'nĕs), **Horace Howard,** author, born in Philadelphia, Pa., Nov. 2, 1833; died Aug. 13, 1912. He graduated at Harvard University in 1854, traveled in Europe three years, and in 1859 was admitted to the bar at Philadelphia. He prepared several excellent editions of works based on Shakespeare and was honored with a degree at Göttingen University. Among his best editions are "Romeo and Juliet," "King Lear," "Merchant of Venice," "Othello," and "The Tempest."

FURNIVALL (fûr'nĭ-vạl), **Frederick James,** philologist, born at Egham, in Surrey, England, Feb. 4, 1825. He studied at the University College, London, and at Cambridge, was called to the bar in 1849, and devoted himself to the study of English literature and the establishment of numerous societies. Among the organizations founded are the Early English Text Society, the New Shakespeare Society, the Chaucer Society, the Shelley Society, the Browning Society, the Ballad Society, and the Wickliffe Society. These societies enabled him to edit many valuable productions from rare writings and to collect numerous paintings and manuscripts, for which purpose he spent about $200,000. Among the most valuable works edited by him are "Early English and Other Works," Chaucer's "Canterbury Tales," Caxton's "Book of Curtesye," Harrison's "England," and "Leopold Shakspere." He died July 2, 1910.

FUR SEAL, or Sea Bear. See **Seal.**

FÜRTH (fürt), a city in Bavaria, Germany, six miles northwest of Nuremberg, at the junction of the Rednitz and Pegnitz rivers. It is a prosperous city and has extensive railway and electric railroad facilities. The chief buildings include the Church of Saint Michael, the public library, the Rathaus, and several secondary schools. It has a large trade in hops and merchandise. Among the manufactures are jewelry, toys, machinery, lead pencils, and scientific instruments. Gustavus Adolphus occupied it in 1632, but was defeated by Wallenstein at Alte Veste, three miles southwest of the city. Fürth has belonged to Bavaria since 1806. Population, 1905, 60,635; in 1910, 66,535.

FUSAN (fōō-sän'), or **Pusan,** a city and seaport of Corea, on the southwestern coast of the peninsula, seven miles from the mouth of the Nan-tong River. It is connected with Seoul, the capital, by a railway and has a safe and commodious harbor, which is protected by Deer Island and several others. Many of the inhabitants are foreigners, chiefly Japanese, to whom the place is known as Kan (the post). It has a large trade in rice, fish, cotton, hides, and merchandise. Fusan has been an open port since 1876. Population, 1917, including Tong-nai, 39,865.

FUSE (fūz), or **Fuze,** a tube or casing filled

with combustible material and used for igniting a charge in a mine, for blasting, and in discharging a hollow projectile. Fuses were invented as soon as hollow projectiles came into use, and are made in various forms appropriate to the purpose for which they are designed. In mining, blasting, and for submarine purposes a cord or tube which contains a slow-burning composition is used, thereby allowing the operators time to get to a place of safety before it burns down to the charge. Many of these, such as the *Bickford fuse,* are covered with pitch, contain gunpowder, and burn at the rate of one yard in seventy seconds. *Percussion* and *concussion* fuses are used for hollow projectiles. The former contain a capsule charged with fulminate, which is exploded with a plunger, or its equivalent, when the projectile strikes, while the concussion fuse is designed to explode the charge when the shell strikes the object. Time fuses and mechanical fuses are used in some forms of torpedoes with dynamite, gun cotton, and other powerful explosives, and are adapted to burn at different times by cutting off a portion of the cord, or are timed by the character of the composition used. Electric fuses are used extensively in the newer implements of war and methods of blasting, and are adapted to ignite by passing an electric spark through them, thereby bringing the current in contact with the explosive composition within.

FUSEL OIL (fū'sĕl), a heavy, inflammable product formed during the fermentation of molasses, potatoes, corn wort, beet roots, and the juice of grapes. In the rectification of spirits it is separated and occurs as an acrid, or oily, liquid, in the last stages of distillation. It has a peculiar odor, a pungent taste, and is poisonous, producing nervous depression and headache. Its presence in brandy, whisky, and other beverages can be detected by rubbing them on the hand, when ethyl alcohol will evaporate and the fusel oil may be readily recognized.

FUSING POINT, the degree of heat at which any substance begins to melt or liquify. Every substance can be fused at a certain temperature, which is the same in a given substance, if the pressure is constant and uniform, but is very different in different metals and substances. Whenever the fusing commences, the temperature of the body ceases to rise, no matter what the intensity or the source of the heat, and the temperature remains constant until the body is completely fused. On the Fahrenheit thermometer the fusing or melting point of mercury is placed at —37.80°; ice, +32°; butter, +89.6°; phosphorus, +109.4°; sulphur, +237°; tin, +395°; lead, +619°; zinc, +680°; antimony, +809°; silver, +1,832°; gold, +2,282°; and iron, +2,732°. The term *vitreous fusion* is applied in the case of substances that melt gradually and have no definite point of fusion.

FUSIYAMA. See **Fujiyama.**



G, the seventh letter and the fifth consonant in the English alphabet. The Greek name *gamma* is an adaptation of the Canaanite term *gimel,* meaning camel. It has two sounds, the hard and soft, and is formed by placing the tongue against the roof of the mouth, then lowering the tongue and giving utterance to voice. The hard sound occurs before a, o, and u, as in *gate, god,* and *gun;* before the consonants l and r, as in *gloat,* and *groan;* when preceding e and i in beginning a word, as in *get* and *give;* and when final, as in *big.* The soft sound was unknown in Anglo-Saxon. It corresponds to ch, as in *church,* and is represented by g before e, i, and y, as in *gem, gin,* and *gymansium.* G is silent before n, as in *gnat.* As a symbol it represents the seventh of the Dominical letters. In music it is the fifth note of the normal scale of C, called *sol,* and the lowest note of the grave hexachord.

GABELLE (gȧ-bĕl′), a French term derived from the German word *Gabe,* meaning gift or tribute, and applied to the duty imposed upon salt. It was first levied in 1286 as a means to protect the trade in salt, which was made a government monopoly. This tax was very unpopular, since it carried with it the provision that every family was compelled to purchase a certain amount of salt per week, and officers intrusted with the enforcement of the law collected it directly from the people. The law was finally repealed in 1790, owing to a widespread rebellion in some of the provinces.

GABLE (gā′b′l), the upper, exterior part of a wall at the end of a building, which receives the roof. It is triangular in form, the roof sloping from the ridge to the eaves, and comprises the gable end of the wall. In classical architecture, such as the Greek temples, it forms the pediment. During the Middle Ages the gable was usually narrow and pointed, owing to the construction of steep roofs. In Gothic architecture it became quite ornamental, because of the introduction of varous decorative features, including tracery and other ornamentations. Gables continue to be a prominent feature of residential buildings, especially in Europe, but in the newer buildings of cities they have been displaced largely by the walls in continuous blocks.

GABRIEL (gā′brĭ-ĕl), one of the seven archangels mentioned in the Scriptures. He is well known in sacred history on account of announcing the birth of Christ to Mary and the birth of John to Zacharias. In the Talmud he is described as a prince who commands the thunder and presides over the ripening of fruits. The Mohammedans class him with three other angels that wrote the divine decrees, and as the person who guided Mohammed in writing the Koran.

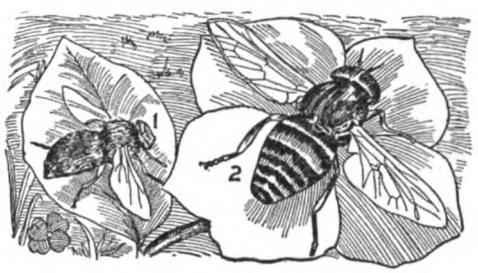
GABUN (gȧ-bo͞on′), or **Gaboon,** an estuary near Libreville, on the western coast of Africa, articulating with the Gulf of Guinea. It is fifty miles long and from seven to ten miles wide. The Como and several other rivers flow into it and it is sufficiently deep for the largest vessels. The country surrounding it was formerly known as the Gaboon territory, which now forms a part of the French Congo. See **French Congo.**

GAD, the seventh son of Jacob by Zilpah, founder of the tribe of Gad in Israel. When Joshua conquered Canaan, the tribe of Gad was assigned territory east of the Jordan, whence they moved northeast and toward the south. It is supposed that they inhabited this country about 700 years, or until about 740 B. C., when they were conquered and carried away in captivity by Tiglath-Pileser.

GADE (gä′dę), **Nils Wilhelm,** composer and musical conductor, born at Copenhagen, Denmark, Feb. 22, 1817; died Dec. 22, 1890. He learned the trade of a cabinet and instrument maker, but abandoned it to take up music. For some time he studied under the leader of the court orchestra and became noted as a student of the romantic school of music. In 1841 he won recognition by his overture entitled "Ossian," for which he was awarded a prize by the Copenhagen Musical Association. The king granted him a stipend for foreign travel and he formed a friendship with Schumann and Mendelssohn. In 1847 he succeeded the latter as director of the Gewandhaus concerts, and three years later became master of the Chapel Royal of Copenhagen. The Danish Folkesthing granted him a life pension of 3,500 crowns. His

productions include "The Springtide Phantasy," "The Erl King's Daughter," "The Crusaders," and "Zion."

GADFLY (găd'flī), or **Horsefly,** the common name applied to various two-winged flies found in the woods and elsewhere during the hot weather. These insects are smaller than the botfly (q. v.). They suck the blood of man and animals and cause a large lump, which forms a tumor and secretes pus, wherever they feed for some time. The eggs are deposited in the skin of animals, and the young subsist upon the pus that exudes from the tumor. The mouth has six sharp needles. These constitute



1, GADFLY; 2, BOTFLY.

a proboscis, or sucker, with which they penetrate the thickest skin. Many species have been described, including the common black gadfly. Another species, the mourning horsefly, has a greenish head and golden eyes.

GADSDEN (găd'zdẹn), county seat of Etowah County, Alabama, on the Coosa River, sixty miles northeast of Birmingham. It is on the Southern, the Louisville and Nashville, and the Chattanooga Southern railroads. The surrounding country produces fruits, timber, and minerals, especially coal and iron. It has a number of fine schools and county buildings. The manufactures include flour, machinery, ironware, cotton goods, and tobacco products. Gadsden was settled about 1845 and incorporated in 1867. Population, 1900, 4,282; in 1910, 10,557.

GADSDEN, James, soldier and diplomatist, born in Charleston, S. C., May 15, 1788; died Dec. 25, 1858. He was the grandson of Christopher Gadsden (1724-1805), a Revolutionary soldier, and served with distinction in the War of 1812. Subsequently he took part in the Seminole campaign in Florida, and in 1822 engaged as a cotton planter in that State. President Polk appointed him minister to Mexico in 1853, in which capacity he negotiated the Gadsden Purchase.

GADSDEN PURCHASE, a tract of land which is now included in New Mexico and Arizona. It embraces an area of 45,535 square miles, and is bounded on the north by the Gila River, on the east by the Rio Grande, on the south by an arbitrary line, and on the west by the Colorado. The average width from north to south is 120 miles. It was purchased from Mexico in December, 1853, for the United States by Gen. James Gadsden for $10,000,000, and the treaty was ratified the following year. The sale of this territory was opposed by many Mexicans and caused Santa Anna to be banished in 1855.

GADSKI (găd'skī), **Johanna,** operatic singer, born at Anclam, Germany, in 1871. She was educated at Stettin, where she developed much ability in music. Though she sang extensively in Germany, her operatic début was made in New York City, where she achieved success as *Brunhilde*. Her strongest parts were carried in Wagnerian rôles. For some time she sang at Covent Garden, in England, and toured Germany and other countries of Europe. In 1898-99 and since she made concert tours of Canada and the United States.

GADWALL (găd'wạl), or **Gray Duck,** a water fowl found in the northern part of both hemispheres, but confined chiefly to bodies of fresh water. It is smaller than the mallard and is a bird of passage. The flesh is highly prized as food. In autumn it moves southward, but returns early in the spring to breed in the northern part of the United States and the southern section of Canada. The color is black and white, but the feathers are variously shaded with brown, giving it a grayish appearance.

GAEL (gāl), or **Gail,** the name of the northern and western branch of the Celtic family of nations. They inhabited the highlands of Scotland, the Isle of Man, and Ireland. Those of the latter country were generally known as Gael of Erin and the others as Gael of Albion. The term Gaelic is now generally applied to the dialect spoken in the highlands of Scotland, which is a branch of the Celtic language, while the people of Ireland and the Isle of Man speak the Irish and Manx, respectively.

GAETA (gä-ā'tà), a fortified seaport city of Italy, on the Gulf of Gaeta, about seventy miles northwest of Naples. The city is located on a promontory, which is crowned by the tomb of Manatius Plancus, who was a friend of Augustus. This structure, known as the Torre d'Orlando, is 160 feet high and is 158 feet in diameter. Gaeta was originally occupied by the Greeks, who constructed many fine public buildings, but it was later conquered by the Romans, who improved and fortified it. Later it was made a part of the Byzantine Empire, was annexed to Sicily in 1184, and was finally captured by the forces of Victor Emmanuel in 1861. Its importance is based largely upon its fortifications, though it has some industries and is visited by tourists for its historical associations. Population, 1906, 5,638.

GAGE, Lyman Judson, banker and public man, born in De Ruyter, N. Y., June 28, 1836. He attended the Rome Academy for four years, and removed with his parents to Chicago, where

he became a bookkeeper in a lumber yard and planing mill. Afterward he secured a position with the Merchants' Savings, Loan and Trust Company, and later became manager of the Bankers' Clearing House. In 1882 he was elected vice president of the First National Bank, becoming its president in 1891. He was chairman of the committee to select a site for the World's Columbian Exposition, becoming first president of the exposition company, and was an important factor in its management. In 1894-95 he was president of the civic federation of Chicago. President McKinley made him Secretary of the Treasury in 1897, in which position he actively promulgated the theories of a single gold standard and the enlargement of the powers of national banks. He was succeeded by Leslie M. Shaw in 1902, when he accepted the presidency of the United States Trust Company in New York City.

GAGE, Thomas, soldier and Colonial Governor, born in Firle, England, in 1721; died April 2, 1787. He saw military service in Scotland and Flanders, and in 1755 was with Braddock's expedition against Fort Duquesne. In 1760 he was appointed governor of Montreal, and subsequently succeeded General Amherst as commander in chief of the British forces in America. When conditions were forming for the American Revolution, he was sent to Boston to repair the fortifications, where he attempted to subdue the antagonism of the colonists to English rule. His destruction of the stores at Concord precipitated the Battle of Lexington. He issued a proclamation offering pardon to all the rebels except John Hancock and Samuel Adams, but this was followed in a short time by the Battle of Bunker Hill, after which he was superseded by Sir William Howe.

GAG RULE, a name applied to any concerted effort to suppress the exercise of the right of a citizen, especially the right of petition. It orginated in 1836, when Congress adopted a rule that all petitions be laid on the table unnoticed. This action was caused by many petitions for the abolition of slavery being presented to Congress. The gag rule was the result of a motion made by John C. Calhoun, but it tended to increase the desire to file petitions, and John Quincy Adams upheld the anti-slavery principles in Congress during ten years. The gag rule was finally rescinded on Dec. 3, 1844.

GAINES'S MILL (gānz'ĕz), **Battle of,** one of a series of battles occurring in Hanover County, Virginia, during the peninsular campaign conducted by McClellan. A part of the Federal army crossed the Chickahominy under command of McClellan, while Fitz-John Porter occupied a position on the north bank of the river with a force of 35,000 men. Generals Lee and Stonewall Jackson made an attack on Porter, June 27, 1862, with a Confederate army numbering 55,000 men. The Federals were driven back with much loss after a two hours' struggle, and were finally forced to give way before superior numbers. Porter crossed the Chickahominy in rapid retreat, burning bridges behind him. His total loss was 6,387 men and 22 guns, and the Confederate loss was somewhat larger. The Battle of Cold Harbor was fought in the same vicinity two years later.

GAINESVILLE, a city in Florida, county seat of Alachua County, seventy miles southwest of Jacksonville, on the Seaboard Air Line and other railroads. Rich phosphate deposits are worked near the city. It is popular as a winter resort. Population, 1910, 6,183.

GAINESVILLE, a city in Texas, county seat of Cooke County, about eight miles south of the Red River and sixty miles north of Fort Worth. It is on the Missouri, Kansas and Texas and the Gulf, Colorado and Santa Fé railroads. The surrounding country is agricultural and stock raising. It has a county courthouse, a public library, a high school, and several fine churches. Among the manufactures are soap, ice, brick, flour, brooms, machinery, and utensils. It was settled in 1851 and incorporated in 1873. Population, 1910, 7,624.

GAINSBOROUGH (gānz'b'rō), **Thomas,** landscape painter, born in Suffolk, England, in 1727; died Aug. 2, 1788. His landscape paintings show much originality and delicacy. As a portrait painter he rivaled Sir Joshua Reynolds. His best known paintings include "Rustic Children" and "The Boy Blue."

GAIRDNER (gärd'nēr), **James,** historian, born in Edinburgh, Scotland, March 22, 1828. He was educated at the university in his native city, and at the age of eighteen years became a clerk in the public record office in London, where he was made assistant keeper of the public records in 1859. His patience, accuracy, and eminent fitness for the work of that office caused him to become favorably known, and he displayed the same characteristics in editing a series of historical documents. He contributed to the "Dictionary of National Biography." His published works include "Life and Reign of Richard III.," "Letters and Papers of Henry XII.," "Historical Collections of a London Citizen," "Three English Chronicles," "The Houses of Lancaster and York," and "Studies in English History."

GAIUS, or **Caius,** celebrated Roman jurist, flourished during the reigns of Hadrian, Antonious Pius, and Marcus Aurelius. He was a teacher and writer upon law, not a practical jurist, and is the author of many works upon the Roman law. His writings were not known until 1716, when German scholars discovered them at Verona and other places. The most important is his "Institutes," which was used freely in compiling the works of Justinian, the "Digest of Roman Law." It was first translated into German by Von Brockdorff in 1824.

GALÁPAGOS (gä-lä'pä-gŏs), an archipelago of volcanic islands in the Pacific Ocean,

about 650 miles west of Ecuador, of which they comprise a possession. The group includes twelve islands of considerable size, of which Albemarle is the largest. The total area is 2,400 square miles. Much of the surface is mountainous, but the soil is productive. The climate is healthful and favorable to occupation by Europeans. Sugar, fruits, cattle, and goats are the principal products. The islands are remarkable for the presence of many birds, though the flora is limited. Many species of turtles and porpoises prevail and lizards and snakes are well represented. These islands were discovered in 1570 and Darwin explored them in 1836. The government of Ecuador has made a number of attempts to colonize the larger islands, but they are very sparsely settled. Population, 1909, 415.

GALATEA (găl-ȧ-tē'ȧ), in mythology, the sister of Thetis, daughter of Nereus and Doris, and aunt of Achilles. She was loved by the Cyclops Polyphemus, but she rejected him and married a shepherd of Sicily named Acis. In a fit of jealousy the Cyclops slew her lover. Greek and Latin poets made the love of Polyphemus a favorite subject in their writings.

GALATIA (gȧ lā'shĭ-ȧ), the name anciently applied to an extensive region of Asia Minor, so called from a large number of Gallic inhabitants, who settled there about 277 B. C. The Gallic invaders of Greece in the 3d century B. C., under Brennus, not only took possession of Byzantium, but crossed the Hellespont, and subdued a large portion of Phrygia and Troas. Later they were confined to certain districts by Attalus, King of Pergamus, the settlements being bounded by Phrygia, Lycaonia, Pontus, Cappadocia, Paphlagonia, and Bithynia. The Galatians retained their old Celtic language more or less distinctly for several centuries, were twice visited by Saint Paul, and produced numerous scholars. In government they were divided into three tribes and twelve tetrarchies, each being under a chief. Saint Paul addressed one of his epistles to the churches in Galatia.

GALATIANS (gȧ-lā'shȧnz), **Epistle to the,** a book of the New Testament, addressed by Saint Paul to the churches of Galatia. Many Hebrew converts belonged to the churches of Galatia and they had incorporated Jewish rites with the ordinances of Christian worship. Paul recalls them to the simplicity of the Gospel in this epistle, in which he vindicates his apostolic commission, urges the doctrine of salvation as the cardinal truth of Christianity, and concludes with exhortations and a benediction. It is thought that this epistle was written earlier than those addressed to the Thessalonians.

GALATZ (gȧ'lȧts), or **Galacz,** a city of Rumania, in Moldavia, on the Danube River, 85 miles above the Sulina mouth. It is situated between the mouths of the Perth and the Sereth and is important for its railroad and river transportation facilities. The trade consists chiefly in grain, tallow, wine, cheese, wool, and fruits. Among the manufactures are clothing, earthenware, machinery, cigars, and leather. It is the seat of a bishop and several schools. Among its principal buildings are a convent, a hospital, several Greek churches, and a number of large bazaars. It has been the scene of many battles between the Turks and Russians. In 1883 it was made a free port. Population, **1917,** 65,503.

GALBA (găl'bȧ), **Servius Sulpicius,** Emperor of Rome, born near Terracina, Dec. 24, 3 B. C., died Jan. 15, 69 A. D. He descended from a wealthy family and was a friend of Augustus and Tiberius. In 20 A. D. he became praetor, was made consul in 33, and in 39 commanded an expedition against the Germans in Gaul. He was intrusted with the administration of Africa in 45, but afterward incurred the enmity of Nero, who plotted to have him assassinated. However, he assumed the title of legate and marched toward Rome, and was made emperor by the praetorians on the death of Nero. His administration soon became unpopular among the praetorian guards, and he incurred the displeasure of the senate by choosing Piso instead of Otho to become his successor. The latter formed a conspiracy among the soldiers and Galba was assassinated in the senate.

GALEN (gā'lęn), **Claudius,** noted Greek physician, born in Pergamus in Mysia, in 130 A. D.; died about 201. He was a profound student of medicine, practised as a physician in the school of gladiators in Pergamus, and later settled in Rome, where he attended Emperor Marcus Aurelius and his household and afterward Emperor Severus. Eighty-three of his treatises are extant, besides which are many others which are regarded spurious. His writings were taken as good medical authority until the 16th century and many are still frequently consulted, especially those treating anatomy and physiology. Galen established the practice of consulting the pulse in the diagnosis of diseases. He treated the works of Hippocrates in numerous commentaries.

GALENA (gȧ-lē'nȧ), or **Lead Glance,** the sulphurate of lead, the ore which furnishes most of the lead of commerce. Pure galena contains 13.3 per cent. of sulphur and 86.7 of lead, but it is usually mixed with a small proportion of copper, silver, zinc, antimony, or selenium. The color resembles that of lead, but it has a metallic luster. It is usually found massive, but sometimes granular or crystallized. The fragments are cubical, into which it is easily broken. It is found in beds, veins, and imbedded masses, frequently accompanying other metallic ores. *Argentiferous galena* is the name applied to deposits that contain a large proportion of silver. Deposits of galena occur in many parts of Canada and the United States, especially in the Rocky Mountains. It is mined near Galena, Ill., in Missouri, Colo-

rado, Wisconsin, British Columbia, and other sections of North America.

GALENA, county seat of Jo Daviess County, Illinois, on the Fevre River, eighteen miles southeast of Dubuque, Iowa. It is on the Chicago, Burlington and Quincy, the Illinois Central, and the Chicago and Northwestern railroads. The noteworthy buildings include the county courthouse, the public library, the Federal building, and the high school. Grant Park contains a statue of U. S. Grant. The surrounding country is agricultural and produces zinc, lead, and other minerals. Among the manufactured products are furniture, ironware, boots and shoes, machinery, brick, cigars, dairy products, and woodenware. The city has electric lighting, a sewerage system, and waterworks. Ulysses S. Grant resided in Galena a number of years. It was settled in 1827 and incorporated in 1839. Population, 1910, 4,835.

GALENA, a city in Cherokee County, Kansas, in the southeastern part of the State, seven miles west of Joplin, Mo. It is on the Missouri, Kansas and Texas, the Saint Louis and San Francisco, and other railroads, and is surrounded by a lead and zinc producing country. The chief buildings include a public library and several fine public schools and churches. It has a foundry, grain elevators, and several smelters. The vicinity was first settled in 1877 and owes its development largely to its mineral interests. Population, 1900, 10,155; in 1905, 6,449; in 1910, 6,096.

GALESBURG (gālz'bûrg), a city and the county seat of Knox County, Illinois, about 163 miles southwest of Chicago, on the Chicago, Burlington and Quincy, the Atchison, Topeka and Santa Fé, and other railroads. The surrounding country is agricultural and dairying, and contains an abundance of bituminous coal deposits. It has a fine county courthouse, a public library of 40,000 volumes, and a park. The institutions include Knox College, Lombard University, Saint Joseph's Academy, and the Ryder Divinity School. Among the municipal facilities are paved streets, gas and electric lighting, electric street railways, and a system of city waterworks. The manufactures include flour, brooms, carriages, tobacco, brick, engines and boilers, and farming machinery. Population, 1900, 18,607; in 1910, 22,089.

GALICIA (gā-lĭsh'ĭ-ä), a province of Austria, whose boundary is formed by Russia on the north and east, and by Bukowina, Hungary, and Silesia on the south and west. It has an area of 30,315 square miles. The Carpathians trend between it and Hungary. Its chief rivers are the Dniester and several tributaries of the Danube and Vistula. Among the principal products are cereals, beef and dairy cattle, horses, poultry, fruits, silk, and divers manufactures. The minerals include coal, alabaster, copper, rock salt, iron, marble, and calamine, of which iron and rock salt are the most important. The inhabitants consist chiefly of two Slavic peoples, the Poles and Ruthenians, but they include many Germans and Greeks. A well-organized public school system is maintained, which terminates in the celebrated universities of Lemberg and Cracow. Lemberg is the capital. Among the other important cities are Cracow, Przemysl, and Tarnapol. Extensive lines of railroads and navigable streams facilitate commercial intercourse. Owing to its productive soil and other natural resources, the province holds a position of importance in the Austrian commonwealth.

Galicia was originally inhabited by Germanic peoples, but the Poles and Ruthenians immigrated in large numbers in the Middle Ages. In the 12th century it was made an independent state, but it soon became tributary to Poland. In 1772, at the first partition of Poland, it was annexed to Austria. The Russians captured Lemberg and Przemysl and overran most of the province in 1915, but were defeated and expelled by the German allies. Population, 1914, 8,340,520.

GALILEE (găl'ĭ-lē), the name applied anciently to one of the four Roman divisions of Palestine. It was bounded by the Jordan River on the east, by Samaria on the south, by the Mediterranean and Phoenicia on the west, and by Syria and the mountains of Lebanon on the north. The northern portion is wooded, but the lower part is level and exceedingly fertile. In the time of Christ the former was usually called Upper Galilee and the latter was known as Lower Galilee. At present the whole of Galilee is included in the vilayet of Syria. Within this region were situated the twenty towns given by Solomon to Hiram, King of Tyre, as compensation for his assistance in building the temple.

Galilee was the early seat of Christian influence and its four towns, Nazareth, Capernaum, Nain, and Cana, are closely associated with the life and travels of Christ. The inhabitants consisted chiefly of Greeks, Syrians, Phoenicians, Arabs, and Jews, and occupied themselves largely as fishermen. They were held in contempt by the educated Jews because of their simplicity of manner and lack of education, on account of which the name Galileans was early applied to Christians. Galilee became the seat of the Jewish doctors of law after the destruction of Jerusalem, and Jewish learning centered largely at Tiberias. Numerous ruins still exist in some portions of Galilee, though most of the region is populated by a destitute people and the towns are stricken with poverty and indolence.

GALILEE, Sea of, an inland lake of Syria, also called Sea of Tiberias, Lake of Gennesaret, and Sea of Chinneroth. It is situated on the east central boundary of Palestine. The surface is 682 feet below the Mediterranean sea. Its extent from north to south is twelve miles; width, seven miles; and general depth

825 feet. The basin is of volcanic origin, the water is fresh and cool, and the northern and eastern coasts are precipitous and barren. It receives the inflow from the Jordan and several other streams, abounds with edible fish, and is known for its association with many important events connected with Christ and the apostles. The region surrounding the lake was densely populated in the time of Christ, though at present there are only the remains of ruined towns, including Capernaum, Magdala, Tiberias, and several others of minor importance. A railroad line connects the lake region with the Mediterranean Sea, and offers assurance that at least a limited amount of prosperity will come to the people within the next few decades on account of increased commercial, fishing, and manufacturing enterprises.

GALILEO (găl-ĭ-lē'ō), the common name of Galileo Galilei, distinguished physicist and astronomer, born in Pisa, Italy, Feb. 15, 1564; died Jan. 8, 1642. He descended from an ancient Florentine family, secured the advantages of early training in literature and arts, and entered the University of Pisa in 1581. Soon after he was induced to investigate the laws of the oscillation of the pendulum by a lamp he saw swinging in the Pisa cathedral, and by it was subsequently led to apply his discovery in the exact measurements of time. The works of Archimedes suggested the hydrostatic balance, which he invented in 1586. In 1589 he became professor of mathematics in the University of Pisa. Having devoted much time to the study of mathematics and natural science, he soon attracted the attention of many learned men. While at Pisa he discovered the law of falling bodies by experiments conducted from the leaning tower at that place, which led him to renounce much of the accepted philosophies, and thereby drew upon himself the enmity and criticism of other scholars.



GALILEO.

In 1592 he accepted the professorship of mathematics at Padua, where he lectured until 1610, and in the meantime enriched the world of science with many valuable inventions and discoveries. Among those announced within this period are a number of improvements in the thermometer and the refracting telescope, discoveries in relation to magnetism and the magnet, and the discovery of the satellites of Jupiter. He discovered the rings of Saturn, the sun spots, and the inclination of the sun's axis to the plane of the ecliptic. Galileo's improvements on the telescope were suggested by a report of the first telescope invented in Holland, in 1608. The following year he constructed an instrument by which objects were magnified three times, and finally produced one that magnified thirty-two times.

In 1610 Galileo was appointed philosopher and grand-ducal mathematician at Florence by Cosmo II., Grand Duke of Tuscany, which afforded him an increased salary and abundance of leisure to promulgate his scientific investigations. By the discovery of the phases of Mercury, Venus, and Mars he further demonstrated the truth of the Copernican theory. He visited Rome for the first time in 1611, where he was received with great distinction, but shortly after was criticised for teaching heresies, to which he replied in a masterful treatise and clearly demonstrated the discoveries resulting from his study of the heavens. His work was examined by a congregation of mathematicians, monks, and cardinals, who condemned it as dangerous to the church and science, summoned him before the Inquisition, and in 1633 the veteran philosopher was compelled to fall upon his knees and abjure by oaths the truths he had discovered and so ably maintained.

It is claimed by some writers that when Galileo rose, after abjuring the truths he had discovered, he exclaimed, *E pur si muove*, meaning, "But nevertheless it does move." The Inquisition thereupon sentenced him to the dungeon for three years, but shortly after permitted him to reside in Sienna and later in Florence. Though losing an eye by disease and having the other highly impaired, he continued his researches, and in 1637 discovered the libration of the moon. His death occurred the year of Newton's birth, after a long and useful life, which was saddened by persecutions and domestic troubles. He was buried in the church of Santa Croce, Florence. The writings of Galileo exhibit a high degree of literary style, cover a wide range of subjects, and are still consulted extensively by learned men. Natural philosophy is as greatly indebted to him as the science of astronomy.

GALION (gāl'ĭ-ŭn), a city of Crawford County, Ohio, eighty miles southwest of Cleveland, on the Erie and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. The surrounding country is cereal, fruit, and stock producing. It has a public library, a fine high school, and several costly church and business buildings. Among the manufactures are vehicles, ironware, flour, pottery, brick, tobacco, and machinery. It is well improved and has many modern facilities, such as electric lighting and street pavements. The place was platted in 1831 and incorporated in 1878. Population, 1900, 7,282; in 1910, 7,214.

GALL (gal), **Franz Joseph,** founder of phrenology, born in Tiefenbrunn, in Baden,

Germany, March 9, 1758; died Aug. 22, 1828. He studied in Baden, Strassburg, and Vienna, practiced medicine at the last-mentioned city, and spent much time in the study of human and animal skulls. After several decades of close application to phrenology, he announced the particular location of twenty organs, wrote and lectured extensively, and attracted widespread attention. For some time he was associated with Dr. Spurzheim at Paris. His field of operation was throughout German-speaking countries, France, and Great Britain. Among his most important writings are "Philosophical and Medical Investigations" and "Anatomy."

GALLAIT (găl-lā'), **Louis,** historical painter, born in Tournai, Belgium, March 10, 1810; died in Brussels, Nov. 20, 1887. He is considered the most noted historical painter among the Belgians of modern times, producing numerous excellent works. He was a member of academies in Berlin, Vienna, and Munich and received the decoration of the Legion of Honor in 1841. His chief works include "The Abduction of Charles V.," "The Family of a Prisoner," "Alva Viewing the Dead Bodies of Egmont and Hoorn," and "A Plague of Tournai." The last mentioned was purchased for the Brussels museum at $24,000.

GALLAS (găl'lăs), or **Oroma,** a race of Ethiopian people who inhabit the eastern part of Africa, chiefly south and east of Abyssinia. They seem to hold an immediate place between the Negroes and the Arabians. Their color is dark brown, their hair is strong and frizzled, and their eyes are small. In stature they are generally large and well formed, the lips are moderate, and the nose is quite straight. Some writers think the Gallas among the best developed races of Africa. They are engaged chiefly in agriculture and stock raising. A majority are pagans, but quite a number belong to the Mohammedan faith and to the Christian church of Abyssinia.

GALLATIN (găl'ă-tĭn), **Albert,** famous statesman, born in Geneva, Switzerland, Jan. 29, 1761; died Aug. 12, 1849. In 1779 he graduated from the University of Geneva, emigrated to America the following year, and enlisted for a brief period in the American army. Shortly after the close of the Revolutionary War he taught at Harvard College, became a naturalized citizen in 1786, and three years later was elected a member of the Pennsylvania State convention. He was chosen United States Senator in 1793, but was not admitted to his seat, and the following year aided in suppressing the Whisky Insurrection. From 1795 to 1801 he was a member of Congress from Pennsylvania, being elected as a Democrat, and took a leading part in national legislation. President Jefferson appointed him Secretary of the Treasury, which position he filled from 1801 to 1813, and as such became known as one of the ablest financiers of America. He was a peace commissioner in 1813-14, aiding in negotiating the Treaty of Ghent, which concluded the War of 1812. From 1816 to 1823 he was United States minister to France, and in 1826 became envoy extraordinary to Great Britain. On returning to America in 1827, he became president of a bank in New York City. Subsequently he published numerous pamphlets, including several on finance, the war with Mexico, the Oregon question, and various other political and national issues. The most valuable of his publications is "Synopsis of the Indian Tribes," a people to whom he gave much study.

GALLAUDET (găl-lą-dĕt'), **Edward Miner,** educator, born in Hartford, Conn., Feb. 5, 1837. He graduated at Trinity College and in 1855-57 was instructor of the Deaf and Dumb Institution at Hartford, which was founded by his father, Dr. Thomas H. Gallaudet. He removed to Washington, D. C., in the latter year and aided in organizing the Columbian Institution for the Deaf and Dumb, and in 1864 became president of the National Deaf-Mute College at Washington. He made an extensive tour of Europe in 1867-68 to visit the principal institutions for the deaf and dumb and on his return to America published a valuable report of his observations. In 1880 he went to Milan, Italy, as delegate to the international congress of instructors of deaf-mutes, and was president of the convention of instructors of deaf-mutes at Jacksonville, Ill. The government of Great Britain invited him to that country, which invitation he accepted in 1886, to give information regarding the methods of teaching the deaf, dumb, and blind in America. Besides writing a memoir of his father, he published "A Popular Manual of International Law."

GALL BLADDER, a pear-shaped sac attached to the liver, lodged in a groove on the lower side of that organ. It contains the bile, which is stored for a brief time, or as needed for use in digestion. The bile enters through the cystic duct into the gall bladder, where it becomes viscid and of a darker color, and passes from it to the gall duct when the food enters the small intestines. Three coats compose the walls of the gall bladder: the inner or mucous coat, the intermediate or muscular coat, and the serous or outer coat. The sphincter muscle, which opens and closes the opening into the duodenum, is subjected to a reflex movement when the bile is discharged. See **Bile.**

GALLEY (găl'lĭ), a vessel formerly used extensively in the Mediterranean. It is low and flat-built, has one deck, and is navigated with sails and oars. The length varied from 100 to 200 feet, the medium sizes being known as half galleys and the smallest as quarter galleys. On each side were twenty oars, which were worked by several men, and there were

two masts covered with lateen sails. The *galleasses* were the largest in size. They had beams thirty feet long, carried three masts and about twenty guns, and were propelled by about 250 rowers. In the reign of Charles VI. they were introduced into France, but were abolished in 1748 by Louis XV. These vessels were used for offensive and defensive warfare, and in the time of peace served in furthering commercial enterprises. Similar vessels were



VENETIAN GALLEASS.

kept by the ancient Greeks and Romans for war purposes, but during the time of peace they aided in commerce and colonization along the seacoast. In printing, a galley is an oblong tray, used to receive the type from the composing stick, and which serves to arrange it in a column or page. The galley has a flange, about one-half an inch in height, on both sides and at one end. After being taken from the galley to the imposing stone, the type is arranged in a chase.

GALLINGER, Jacob H., public man, born in Cornwall, Ontario, March 28, 1837. He studied medicine and began to practice in 1858, and was elected a member of the New Hampshire Legislature in 1872. He was State Senator for three years, serving as president of the Senate in 1879-80. For two years he served as surgeon general of the State, with the rank of brigadier general. In 1891 he was elected as a Republican to the United States Senate and was reëlected in 1897 and 1903.

GALLIPOLI (găl-lĕp′ō-lē), a seaport city of European Turkey, in the vilayet of Adrianople, 125 miles southwest of Constantinople. It is located at the northern end of the Dardanelles and was once strongly fortified, but its commerce has declined and the fortifications are in a dilapidated condition. The streets are irregular and poorly paved, but it has a number of fine bazaars and many mosques. The manufactures include cotton and silk goods, leather, clothing, and utensils. The town was of great importance in ancient times, since it commands the entrance into the Sea of Marmora. The Turks captured it in 1354 and in 1854. It was the scene of vast military operations in the Crimean War as well as in 1914 and 1915. Population, 1914, 28,950.

GALLIPOLIS (găl-lĭ-pō-lēs′), a city of Ohio, county seat of Gallia County, 56 miles southeast of Chillicothe. It is located on the Ohio River and on the Toledo and Ohio Central and other railroads. The surrounding country contains valuable coal deposits. The manufactures include stoves, furniture, leather, and machinery. Waterworks, electric lights, and sewerage are among the improvements. It is the seat of Gallia Academy, has a public library, and contains several fine schools and churches. It was settled by French colonists in 1790 and was chartered as a city in 1865. Population, 1900, 5,432; in 1910, 5,560.

GALLIUM (găl′lĭ-ŭm), a chemical element discovered in 1875 by the French chemist Lecoq de Boisbaudran. It resembles aluminium in the character and composition of its compound, and is obtained in a number of zinc blends, especially on the Rhine. It has a gray color and a brilliant luster, and may be hammered into thin plates that do not break easily by bending. See **Chemistry.**

GALLON (găl′lŭn), a measure of capacity used in measuring liquids. The standard gallon, sometimes called wine gallon, contains 231 cubic inches and is used in the United States. It is equal to 8.3388 avoirdupois pounds, or 3.7853 liters. A gallon contains four quarts and is equal to eight pints, or thirty-two gills. The English imperial gallon contains 277.274 cubic inches and is equal to ten pounds avoirdupois of distilled water.

GALLS, or **Gallnuts,** the abnormal growth produced on growing plants by a number of insects or closely allied mites. These insects deposit their eggs in the bark or leaves, and within the galls that subsequently develop are nourished and developed the young in certain stages of their growth. The deformities vary in form, color, and texture, ranging from the simple pouchlike bulging of the leaf to the most imperfect and complicated structure. Many gallnuts are important as articles of commerce, especially those obtained from the dwarf oak in Western Asia. They are brought to America principally from Syria and Asia Minor, and vary in size from that of a pea to that of a nutmeg. Those gathered when of good size, but before the insect by which they are caused has eaten its way out, are the best commercial product. They are known as *black* or *blue galls* and are rich in gallic acid, which is used in medicine and for the manufacture of ink and dyes. Those gathered after the insect has escaped are called *white galls* from their lighter dingy color. Those engaged in the enterprise of cultivating trees for their galls examine them carefully about the season of gathering, in order that they may be collected in their best condition. Gall insects are very numerous. They include the gadfly, the sawfly, and some species of mites, aphides, and spiders.

GALLSTONES. See **Bile.**

GALT (gâlt), a city of Ontario, in Waterloo

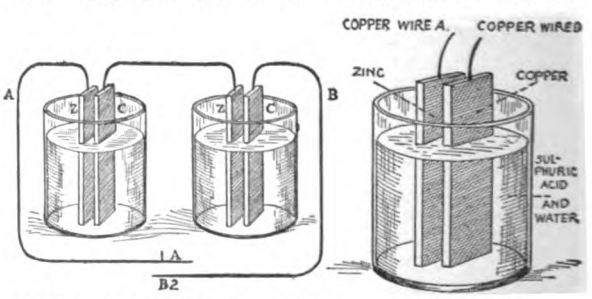
County, on the Grand River, 54 miles from its entrance into Lake Erie. It is on the Canadian Pacific and the Grand Trunk railways and is surrounded by a fertile region. Waterworks, electric lighting, and street pavements are among the public utilities. The manufactures include flour, woolen goods, ironware, edgeware, and machinery. It has a considerable trade in produce and merchandise. Several educational institutions, including a collegiate institute, are located here. It was named from John Galt, the Scotch author. Population, 1901, 7,866; in 1911, 10,299.

GALT, Sir Alexander Tilloch, financier and statesman, born in London, England, Sept. 6, 1817; died Sept. 19, 1893. He emigrated to Canada at an early age and became a clerk in a private land office. In 1844 he was made the manager of the estates of his company and five years later became a member of the Canadian Parliament, in which he served a long term of years. He became Minister of Finance at an early date in his official career and served on the Halifax Fishery Commission. In 1880-83 he was High Commissioner for Canada in England, and in the latter year became a member of the executive committee of the International Fishery Exhibition. He published "Church and State in Canada," "Future of the Dominion of Canada," and "Canada from 1849 to 1859."

GALTON (gal'tŭn), **Francis,** explorer, born in Duddeston, England, in 1822. He was a cousin of Charles Darwin, attended King Edward's School in Birmingham, and later graduated at Trinity College, Cambridge. In 1846 he traveled in Africa, visited many places of interest in Egypt and the cataracts of the Nile, and in 1850 explored in South Africa, including Damaraland and Walfisch Bay. He was the first to penetrate inland from the coast to Lake Ngami, of which region he published a valuable report. In 1863 he demonstrated the existence and established the theory of anticyclones, prepared several charts relating to the elements of the weather, and laid the foundation of weather forecasts. He is the inventor of instruments relating to geographic and meteorologic affairs, and devised apparatus for taking measures in psychology. His chief publications are "Narrations of an Explorer in Tropical South Africa," "Meteorographica, or Methods of Reporting the Weather," "Hereditary Genius," "Inquiries into Human Faculty," "Natural Inheritance," and "Index of Finger Prints." He died Jan. 17, 1911.

GALVANI (gal-vä'nē), **Luigi,** famous physician and anatomist, born in Bologna, Italy, Sept. 9, 1737; died Dec. 4, 1798. He studied in the University of Bologna, entered upon the practice of medicine at that place, and in 1762 was appointed professor of anatomy at the university. In 1791 he published a work relative to his discoveries and theories of animal electricity, and prepared a number of treatises showing advanced views in the study of comparative anatomy. He was deprived of the chair of anatomy at Bologna in 1797, in consequence of his refusal to take the oath of allegiance to the Cisalpine Republic, but afterward was restored to the position. His theories of animal functions in relation to electricity were largely deduced from numerous experiments, and led to valuable results in the knowledge of galvanism, and to the invention of instruments for measuring the force of electric currents. While his writings are not numerous, they are characterized by precision and minuteness of detail. Among them are "On the Organs of Hearing of Birds" and "Considerations on the Urinary Organs of Birds."

GALVANIC BATTERY (găl-văn'ĭk), or **Voltaic Battery,** a combination of two metals in a liquid chemically acting upon one to a greater extent than the other. The discovery is due to Luigi Galvani (q. v.), from whom the name was applied. In experimenting with the legs of recently killed frogs he noticed that, when hung up against an iron balustrade and the large nerves of the frogs' legs were brought in contact with the metal, they twitched as violently as in life. This phenomenon was due to bringing the muscles into electric connection. He ascribed the action to a vital fluid, which he thought came out of the nerves and flowed through the iron to the muscles. The experiments attracted the attention of Volta, a distinguished physicist of Pavia, who showed that these movements were caused by electricity and constructed an arrangement called a *voltaic battery* or *pile,* by which powerful continuous currents could be readily produced.



GALVANIC BATTERY OF TWO CELLS. VOLTAIC CELL.

The simplest form of the voltaic cell consists of a plate of zinc and a plate of copper immersed in water containing sulphuric acid. The accompanying illustration shows a single voltaic cell and a battery of two cells, showing the method of coupling up the plates of continuous cells. No action takes place, if the zinc is pure, until a complete circuit is made by connecting the plates with a wire, but the plates must not come in contact with each other in the liquid.

The action occurs between the liquid and the zinc, and hydrogen gas is seen to escape in minute bubbles from the copper. This gas, being produced by the current of electricity, continues to flow in the circuit as long as the chemical action continues. In this simple voltaic cell the end of the projecting copper plate is the positive pole or terminal, and the corresponding end of the zinc plate is the negative pole or terminal.

Many forms of voltaic cells are in use, but usually they are arranged in two classes—single-fluid cells and double-fluid cells. In the former only a simple electrolyte is employed, and in the latter two different electrolytes are used, one for each element of the voltaic couple. Ordinary zinc is impure and, when the circuit is broken, is wasted by the electrolyte acting upon it. This tends to weaken the strength of the current when the circuit is replaced. The waste may be averted by amalgamating the zinc, which is done by dipping it in acid and then rubbing mercury over its surface. A battery consists of two or more voltaic cells so connected as to secure a stronger current than can be obtained from a single cell. By constructing a battery with a large number of cells it is possible to overcome a powerful resistance or to supply a strong current.

GALVANISM (găl'vȧ-nĭz'm), the branch of electric science which treats of current electricity arising from chemical action, as distinguished from that generated by heat or induction. The term came into use from Galvani, the discoverer of animal electricity. See **Galvanic Battery; Electricity,** etc.

GALVANIZED IRON (găl'vȧ-nīzd), the name given to iron which is covered by a coat of zinc, with or without galvanic deposition. Properly galvanized iron is a sheet of iron first plated with tin and then immersed in a sal ammoniac and zinc mixed fluid, which forms another coating. Less properly the iron is cleaned by diluted acid and friction, heated, and, without any galvanic current, is plunged into a bath of melted zinc covered with sal ammoniac and stirred until the surface becomes coated with zinc. Articles made of galvanized iron, such as household utensils, fencing wire, roofing sheets, and water pipes, are proof against corrosion as long as the iron is covered with the coating.

GALVANOMETER (găl-vȧ-nŏm'ē-tēr), an instrument used for measuring or indicating delicate currents of electricity. Many forms of this instrument are in common use, but all of them take advantage of the force exerted by currents on movable magnets in their neighborhood. The common form consists of an electro-magnet, on which a magnetic needle is balanced. The direction of the current is indicated as the needle is turned toward the right or the left, and a scale of degrees indicates the strength of the current as the needle moves. In the tangent galvanometer, which is used to measure stronger currents, the conducting wire is carried in the circumference of a circle entirely around the needle so that its diameter is ten or twelve times the length of the needle. The current in these instruments is proportional, not to the angle through which the needle turns, but to the tangent of the needle.

GALVESTON (găl'vĕs-tŭn), a city of Texas, county seat of Galveston County, on Galveston Island, at the entrance of Galveston Bay. It is on the Southern Pacific, the Missouri, Kansas and Texas, the International and Great Northern, and other railroads, and has direct steamboat connection with the leading ports of America and Europe. The bay is from ten to twenty miles wide and about thirty miles long, and the island has a width of three miles and a length of about thirty. An extensive breakwater has been constructed to protect the harbor, which affords unexcelled anchorage for the largest vessels. Intercommunication is by a network of electric railways, with which are connected several suburban and interurban lines. The city is protected from overflows by a sea wall of cement and concrete. This structure, completed in 1904, is 17,595 feet long, five feet wide at the top and sixteen feet at the base, and is seventeen feet high than the mean low tide.

The city has an area of about fourteen square miles and is built mainly toward the inland side of the island. It has well-improved streets, especially the newer part, where much has been done to raise the surface by grading. Among the noteworthy buildings are the county courthouse, the customhouse and post office, the Ball High School, the Rosenberg Library, the Masonic Temple, the Y. M. C. A. building, and many business houses and hotels. It is the seat of the medical department of the State University, two Roman Catholic academies, Saint Mary's Hospital, two orphan asylums, and other institutions. A railroad bridge nearly two miles long connects the island with the mainland.

As a cotton market Galveston is one of the most important centers in the United States, while its trade in lumber, wool, live stock, and cereals is correspondingly large. Among the manufactures are flour, ironware, beverages, cotton-seed oil, clothing, fabrics, and machinery. It ranks second in exports among the exporting cities of the United States and its exports of cotton are paralleled only by those of New Orleans. The municipal improvements, such as gas and electric lighting, waterworks, sewerage, and pavements, are well established. Galveston was settled in 1837 and incorporated in 1839. General Magruder captured it for the Confederates in 1863. In 1900 a large part of it was destroyed by a severe storm, but it was rebuilt with an enterprise equaled only by the activity of its business men. Population, 1910, 36,981.

GALVESTON BAY, an inlet on the southeastern shore of Texas, extending about thirty

miles inland from the Gulf of Mexico. It is separated from the latter by Galveston Island, which is connected with the mainland by a railway, whose terminus is at Port Bolivar, opposite Galveston. The area is about 450 square miles.

GALWAY (gal'wā), a seaport city of Ireland, capital of Galway County, 120 miles west of Dublin. It is located at the mouth of the Corrib River, on the northern shore of Galway Bay, and has a large export trade in wool, fish, marble, and agricultural produce. The manufactures include flour, canned fish, ironware, and spirituous liquors. The older part of the town has crooked streets, but the newer part is well platted and built of substantial material. Among the chief buildings is the Church of Saint Nicholas, founded in 1320. It has a fine county courthouse, five nunneries, and three monasteries, and is the seat of Queen's College. The city has railroad and electric railway facilities, waterworks, and gas and electric lighting. The Irish language is spoken by many of the people. Population, 1916, 13,634.

GALWAY BAY, an important bay on the western coast of Ireland, extending inland from the Atlantic, between the counties of Clare and Galway. It is from six to twenty miles wide and thirty miles long, and at its entrance are the Arran Islands. Galway, a seaport of western Ireland, is situated on the northern shore.

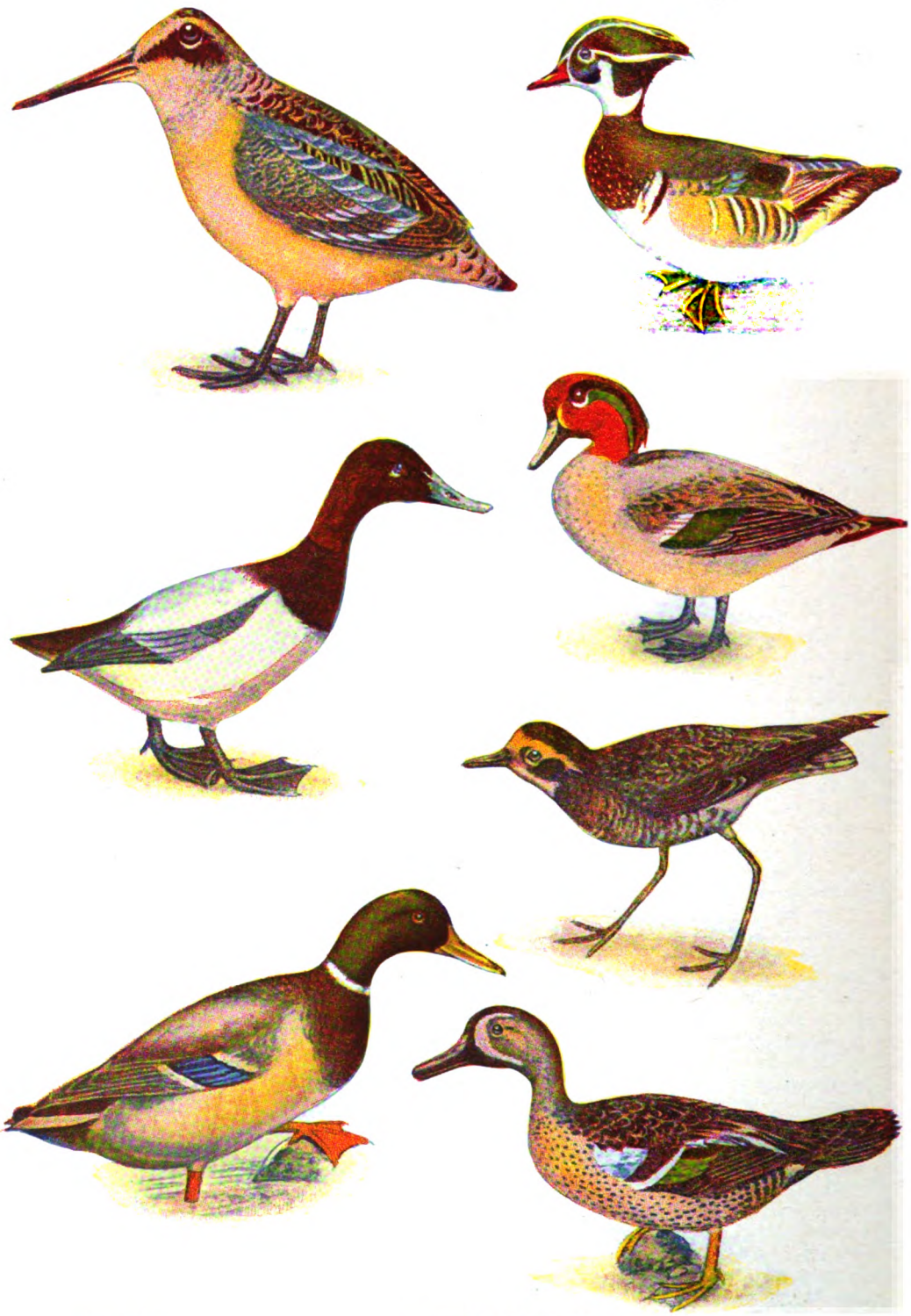
GAMA (gä'mà), **Vasco da,** famous navigator, born at Sines, in the province of Alemtejo, Portugal, in 1469; died in Cochin, India, Dec. 25, 1524. He descended from an ancient royal family, distinguished himself as a mariner at an early age, and in 1497 was given command of an expedition to discover a southern passage to India. The expedition included four vessels, equipped with abundant apparatus and manned with 160 sailors. He sailed from Lisbon on July 8, 1497, and after a stormy voyage of four months reached Saint Helena Bay, near the Cape of Good Hope. Later he doubled the cape, cruised along the coast of Mozambique, and visited Mombaza, Melinda, and Calicut, India, reaching the last-mentioned place May 20, 1498. After remaining at Calicut for some time, the ruler became hostile, and Gama was obliged to resort to forcible means in order to leave the harbor.

In September, 1499, he returned to Lisbon, where he was received with much enthusiasm, made a noble, and named admiral of the Indies. He was granted an annual pension and extensive commercial privileges in India. In 1502 he was sent to Calicut with a fleet to avenge the destruction of a Portuguese colony, where he destroyed the Indian fleet, secured a favorable treaty of peace, and on his return voyage to Portugal founded colonies in Mozambique and Sofala. King John III. appointed him viceroy of India in 1524, but he died there three months after landing. The remains were taken back to Portugal and buried with military display. Gama ranks in importance as an explorer and navigator above all others with the exception of Columbus. He succeeded in largely widening the influence and importance of the commerce and prosperity of Portugal.

GAMBETTA (găm-bĕt'tà), **Leon,** noted statesman, born in Cahors, France, April 3, 1838; died in Paris, Nov. 27, 1882. He secured a college education and studied law in Paris. Becoming imbued with republican doctrines, he opposed the Napoleonic oppression of liberal thought. He was elected to the Chamber of Deputies in 1869 from the Paris district and in 1870, when Napoleon III. surrendered at Sedan, he proposed the dissolution of the empire and took a prominent part in proclaiming the republic on September 4 of that year. In the new government he became minister of the interior, aided actively in resisting the capture of Paris by the German army, and during the siege escaped from the city in a balloon. After the capitulation of Paris, he still remained active, and refused to participate in the convention for the ratification of the peace treaty. His efforts were potent in reorganizing the republican party and a national force. In 1879 he forced the resignation of MacMahon as president, and the following year was elected president of the Chamber of Deputies. In 1881 he was selected premier and president of the council. The ultra radical reforms proposed by him ended his ministry in a few weeks. His death was the result of an accident from carelessly handling a revolver, from which he received a dangerous wound in the hand. Gambetta ranks as one of the most eminent public men of the present republic. He was held in universal esteem as a statesman.

GAMBIA (găm'bĭ-à), the oldest and most northerly British colony on the west coast of Africa. It has an area of 69 square miles. The surrounding sphere of influence tributary to Gambia comprises with it a colony and a protectorate of 3,061 square miles. Rice, cotton, corn, hides, beeswax, and rubber are exported. The district contains some exceedingly fertile tracts of land, though much is unproductive. As a colonial possession it is important mainly on account of commanding the Gambia River, which furnishes extensive means for interior navigation and trade. The government is administered through a local executive and a legislative council. Bathurst, situated on the island of Saint Mary, is the chief town and has 7,500 inhabitants. Only a comparatively few of the inhabitants are whites, about 200, and a majority of the natives are Mohammedans. A considerable missionary work has been done by the Christian churches. The slave trade was abolished in 1906. Population, 1916, of the colony, 13,945; of the protectorate, 97,284.

GAMBIA, an important river of Western Africa, rises in the mountains north of Liberia,



(Opp. 1093)

FAMILIAR GAME BIRDS.

Woodcock.
Canvasback Duck.
Mallard Drake.
Wood Duck.
Green Winged Teal.
Golden Plover.
Red Winged Teal.

flows in a northwesterly direction to the Atlantic, and has a total length of 725 miles. The estuary has a width of 25 miles some distance from its mouth, but at the place where its waters join the Atlantic it is only about two miles wide. The lower valley is overflowed in the rainy season, leaving rich alluvial deposits, which greatly enhance the annual productions. Vessels navigate the river for 650 miles from June to November, but large craft sail only about 90 miles inland.

GAMBLING (găm'blĭng), the practice of playing a game of chance for pecuniary profit. It was the custom in very early times to exercise some legal control over the sports and pastimes of the people, especially those involving an element of game or gambling. Certain games were reserved for people of the higher classes in society, or were prohibited altogether. In modern times legislation has been directed toward suppressing the games that are considered dangerous to life, as well as those in which gambling is made the direct object. *Betting* is a form of gambling and is prohibited in most countries, though prizes are permitted, such as those awarded to the winner in a foot race or to the successful side in a game of ball. The laws of England and the United States provide a penalty for those who keep a gambling house as well as for those who actually engage in gambling.

GAMBOGE (găm-bōōj'), a gum resin used in painting and for lacquer work. It is obtained from the gamboge tree, which is native to the East Indies and Southern Asia. It grows to a height of forty feet and has oval leaves, small flowers, and clusters of edible fruit. The gum resin is obtained by making an incision in the tree, when the gamboge exudes as a yellowish juice, and after exposure to the air becomes hard. It is collected in earthen vessels and left to thicken, or is poured when semi-fluid into the hollow joints of the bamboo, thus giving it the form of cylindrical sticks. The finer quality of gamboge is brittle and of a reddish-orange color, has no odor, and is acrid to the taste. Powdered gamboge has a bright yellow color. Several species of trees in Mexico yield gamboge, but the quality is inferior to that obtained from Asia.

GAME, the general name applied to birds and animals that are hunted for their flesh or for various commercial purposes. These animals are pursued and captured by some persons as a vocation and for purposes of recreation. *Game laws* have been enacted to regulate the hunting of game, otherwise many species of useful animals would be exterminated by useless destruction. At first legislation was directed more particularly to prevent hunting for a brief period during the breeding season, but now the laws are more stringent and either prohibit killing some animals at any time, or limit the hunting seasons to a short period each year. In some countries it is required that a license be taken out before any kind of game can be killed, while in others hunting under any circumstances is prohibited. The ruthless destruction of the buffalo and elk has exterminated them in the hunting grounds and they are found at present only in parks and reservations. Such animals as the quail, deer, duck, goose, brant, and grouse may be hunted only at certain seasons, depending upon the locality and the habits of the species.

Game preserves are grounds set apart for breeding and protecting of game. They are either private or public. Private preserves are very numerous in Europe, where the wealthy maintain them to breed and hunt useful species. Such estates are the property of the nobles, especially in Germany, Austria-Hungary, and Great Britain. Many large preserves are maintained in Canada and the United States, in which it is aimed to protect the primeval scenery as well as many species of game. The Roberval Club of Canada has a preserve of 500 square miles in the Laurentian Mountains, and the most notable government preserve of Canada is that of Henri Menier, which consists of the entire Anticosti Island, in the Gulf of Saint Lawrence. The Vanderbilt game preserve at Biltmore, N. C., is the largest private reservation of this kind in the United States. That country has many public reservations, such as the Yellowstone National Park, where animals and natural scenery are protected for the benefit of the people.

GAMES, a class of amusements or sports, played either as a pastime or to test physical or mental skill. Among many ancient peoples, especially the Greeks and Romans, it was customary to play games at regular intervals. These games were in the form of public exhibitions of skill and strength. They were maintained under the patronage of the government and usually accompanied with religious ceremonies. The Grecian games included the Isthmian, Nemean, Olympian, and Pythian. The gladiatorial games of Rome made famous the circus and the amphitheater. Among the most popular modern games may be mentioned baseball, cards, croquet, tennis, billiards, football, etc. See **Athletics; Circus; Olympic Games.**

GANGES (găn'jēz), one of the most important rivers of Asia, rises in Garhwal, at the western slope of the Himalaya Mountains. It is formed by the junction of the Bhagirathi and the Alaknanda rivers, at Deoprag, about ten miles east of Srinagar. The Bhagirathi is regarded a sacred stream by the natives, has its head 13,800 feet above sea level, and is considered the source of the Ganges, though a larger volume of water is brought from a great distance by the Alaknanda. Among the principal tributaries of the Ganges are the Jumna, Gandak, Son, and Kusi, though there are numerous other tributaries, while the Brahmaputra re-

ceives the main channel of the delta, called the Padna, or Padda, and the other streams of the delta flow into the Bay of Bengal. The lower basin constitutes the great valley of Hindustan. It contains much fertility and is one of the most important regions of Asia. Branches begin to flow out from the main stream about 225 miles from its mouth, forming a vast delta in the nature of level and waste swamps, through which many channels course and intersect each other at various points. The entire length is 1,550 miles and the basin drained embraces 395,000 square miles. The largest branches of the delta are the Hugli and the Meghna, the former being on the west side and the latter on the east, and these begin about 200 miles or more from the sea.

Among the principal cities situated on the banks of the Ganges are Cawnpore, Faruckabad, Bahar, Benares, Calcutta, Patna, Allahabad, and Murshedabad. Navigation extends a distance of nearly 1,250 miles from the Bay of Bengal, which makes it an important avenue for commercial and passenger intercourse, though within late years several railroad lines have been constructed in various directions through and along the valley. In the hot season of the year the volume of water is decreased slightly, while in the rainy season great floods cover the lower country, when the water extends over a region about one hundred miles wide. The floods recede about the middle of August, leaving rich alluvial deposits to greatly fertilize the soil. The river is held sacred by the Hindus, who either bathe in it or partake of its waters. From this custom a considerable industry has arisen, and the water is bottled and carried as an article of commerce to the remote interior districts. Bathing in the Ganges is considered necessary in order to exempt the dead from returning to the earth to recommence life anew. The Hindus think that those who partake of the water have assurance of eternal bliss. Throngs of pilgrims visit various points annually, especially at Allahabad, where a great fair is held periodically.

GANGES CANAL, an artificial canal of India, constructed to overcome the obstructions of the Ganges River above Allahabad. It was commenced in 1848 and cost about $25,000,000. The total length is about 700 miles, 400 miles of which are navigable, while the remainder and a large number of branches are used to irrigate the country which lies between the Ganges and the Jumna.

GANGLION (găn'glĭ-ŏn), in anatomy, an enlargement of the nerves, consisting of a small rounded or elongated nervous mass, usually of a reddish-gray color. Two kinds of nervous ganglia are recognized, those of the sympathetic system and those of the cranial system of nerves. They serve to strengthen nervous impulse, or act as centers for communication with distinct sets of nerves.

GANGRENE (găn'grēn), or **Mortification,** the loss of life in any of the soft parts of the body, without extinction of the vital powers in the rest of the organism. It is either partial or complete. In the former case it does not completely destroy the sensibility of the nerves, hence the local loss of action may be recovered, while in the latter it results in the death of a part. Gangrene is fatal in case it affects a vital part, such as the stomach, but amputation may be resorted to when it attacks a limb or an exterior wound. Modern methods of applying aseptic remedies have overcome the danger of gangrene in wounds, though formerly many deaths resulted from this cause.

GANNET (găn'nĕt), a web-footed bird related to the pelican and classed with the sea fowls. The bill is longer than the head, the beak is strong, and beneath the throat is a small pouch. The plumage is white, except the top of the head, which is yellowish, and some species have gray and black markings. Gannets swim well and have a powerful flight. They capture fish by plunging several hundred feet through the air, striking headlong downward to the surface of the water. They are migratory, passing from the Gulf of Mexico in the spring to breed on the northern coasts of the United States and in Southern Canada. In Europe they breed as far north as the coast of Norway and in autumn move southward to the Madeira Islands.

GANSEVOORT (găns'vōōrt), **Peter,** soldier, born at Albany, N. Y., July 17, 1749; died July 2, 1812. He joined the army at the beginning of the Revolution, serving as major of volunteers in a New York regiment. In 1776 he took part in the invasion of Canada, became lieutenant colonel, and was placed in command of Fort George. The following year he defended Fort Schuyler against a force of British under Saint Leger. Soon after he was made brigadier general in the New York militia and in 1809 received the same rank in the regular army. For a number of years he was commissioner of Indian affairs and military agent.

GANYMEDE (găn'ĭ-mēd), the youngest son of Tros, King of Troy, and celebrated as the most beautiful of mortals. While drawing water from a well at Mount Ida, he was observed by Zeus, who noticed his remarkable beauty and sent his eagle to transport him to Olympus, where he was endowed with immortality and appointed cupbearer to the gods. He is represented in statuary as a youth of exquisite beauty in form, short golden locks, delicate features, beaming blue eyes, and pouting lips.

GAPES (gāps), a disease common to fowls and other birds, due to parasitic worms. The gapeworm causes the bird to choke and induces inflammation. It may be removed, after treating the throat with spirits of turpentine, which is done by thrusting a moistened feather into

the windpipe. Mammals are affected by similar organisms lodging in the air passages, but their presence is not easily detected, hence no effective treatment can be given.

GAR, or **Gar Pike,** a fish of the ganoid family, found in the fresh waters of North America. It has an elongated body, is somewhat cylindrical in form, and is covered with bony scales. The teeth are sharp and set in the jaws of a prolonged bill. The garfishes range from Canada to Texas and live by preying upon other fishes. They are sometimes called *billfishes,* or *bony pikes,* and are not considered good for food. The marine garfishes are larger, from three to five feet long, and are widely distributed. They often leap high out of the water in pursuit of the flying fishes, which they pursue for food. These fishes are numerous in the Gulf of Mexico and the West Indies.

GARBAGE (gär'bāj), the discarded remnants of materials which accumulate in cities. Within recent years the authorities of the great centers of population have turned their attention to utilizing garbage in fertilizing and increasing the productiveness of the soil. In New York, Boston, Montreal, and other American cities these wastes are removed by vehicles. Usually they are classified as waste and usable, after which portions are utilized and the remainder is disposed of in a manner best calculated not to impair public health. In many of the cities of Europe garbage is transported by convenient and well-protected means to outlying districts, and, as a result, large areas of waste and unproductive lands have been reclaimed and rendered valuable. This process of utilizing offal and sewage has largely improved the sanitary conditions, lessened the liability of breeding trichinae in hogs fed with refuse matter, and tended to maintain the purity of the city water supply. Many cities maintain garbage furnaces, which were first installed in Great Britain, and they are utilized to burn the class of waste matters that are considered dangerous to public health. It is not difficult to realize how sanitary conditions may be improved by lessening the amount of decaying litter which is often found in cellars and other places throughout many cities. The garbage disposal of New York City, not including the ashes and light wastes, is esitmated at about 300,000 tons per year. In Chicago much of the garbage materials has been used in filling and grading, both in the low lands and in making land along the lake front.

GARCIA (gär'shĭ-à), **Manuel,** singer and composer, born in Seville, Spain, Jan. 21, 1775; died June 19, 1832. He first appeared to good advantage as a singer at Cadiz and Madrid. In 1808 he obtained success at the Italian opera in Paris, and soon after appeared with equal favor in Rome and Naples. Later he sang in Berlin, Vienna, and London, and in 1825 visited the United States and Mexico, where he conducted a strolling company made up partly of his own family. After returning to Paris, he devoted himself to teaching singing and voice culture. His second daughter, Pauline Garcia, born in Paris in 1821, attained to high repute as a vocalist and operatic singer.

GARCIA Y INIGUEZ (gär-sē'à ē ē-nē'-gās), **Calixto,** Cuban patriot, born in Holguin, province of Santiago, Cuba, Oct. 14, 1838; died in Washington, D. C., Dec. 11, 1898. He descended from an excellent family, received a good education, and was trained for the profession of law. In 1868 he began a long career as a Cuban patriot by joining the revolutionary forces in the Ten Years' War. He was put in command of 150 men, with whom he took decisive action by driving the Spaniards from Holguin and other towns of Santiago. When the provincial government removed Maximo Gomez, Garcia became commander in chief. In 1873 he was captured by the Spanish forces, transported to Spain, and imprisoned in Valencia and Santona. In 1877 he was released and took up his residence in New York City, and in 1880 returned to Cuba to assist Antonio Maceo in an insurrection. However, he was soon after captured and taken to Madrid, where he remained in prison for fifteen years, during which time he taught French and English to young Spaniards.

In 1895 he escaped from Madrid and came to New York, where he enlisted men and secured arms and ammunition valued at $200,000 for service in the Cuban revolution of 1896. Shortly after he proceeded to Cuba and, after numerous campaigns, secured control of a large portion of the interior of the island. In 1898 he rendered valuable service to the United States army with a force of 4,000 Cubans, with whom he took part at the Battle of El Caney. He aided materially by reconciling the Cubans to the temporary occupation of the island by the United States forces. His death, which occurred shortly after Cuba was liberated, but before the wholesome effects of Spanish evacuation were realized, caused profound sorrow. His remains were taken to Cuba in the United States dispatch boat *Dolphin* for burial, accompanied by a large guard of Americans.

GARCILASO DE LA VEGA (gär-thē-lä'-sō dā lä vā'gà), historian, known as the Inca, born in Cuzco, Peru, in 1540; died in 1616. He descended from a family of Spanish pioneers in Peru, and his mother was an Inca princess. In 1560 he went to Spain, where he took part in the wars against the Moors and Turks, and later retired to private life at Cordova. He translated several works from the Italian, including Abarbanel's "Dialogues of Love," and wrote a number of valuable historical works pertaining to America. The latter include "History of Florida" and "Royal Commentaries of Peru."

GARDA (gär'dà), a lake of Italy, the largest

in that country. It is 35 miles long, about 8 miles broad, and covers 190 square miles. The lake is fed by the melting of the Alpine snows and by the inflow of the Sarca River, and its surplus is conveyed by the Mincio to the Po River. It is a beautiful sheet of water and is traversed by numerous steamers. On its shores are many villas and towns, including Salò and Gardone-Riviera.

GARDEN CITY, a village in Nassau County, New York, about eighteen miles east of New York City, on Long Island, on the Long Island Railroad. It was laid out by A. T. Stewart as a model villa town, intended for residential purposes, and is beautified by numerous boulevards and avenues of trees. Among the buildings are a fine Gothic cathedral, a memorial school for boys, a female seminary, and other extensive structures. The Protestant Episcopal bishop of Long Island has his residence in Garden City. It is a popular residence of many New York business men.

GARDEN OF THE GODS, the name of a region in Colorado, near Colorado Springs. The name applies to a tract of 500 acres, remarkable for the grotesque forms of huge red and white sandstone, many of which bear local names, such as Seal Rock and Cathedral Spires. Near the entrance is the gateway, formed of bright red rocks fully 325 feet above the surrounding surface.

GARDINER (gärd'nēr), a city of Kennebec County, Maine, at the junction of Cobbossee and Kennebec rivers, six miles south of Augusta, on the Maine Central Railroad. An abundance of water power facilitates the operation of numerous manufacturing establishments, including sawmills, machine shops, and flouring mills. It has a public library and a number of fine schools. Among the municipal improvements are electric lights, waterworks, pavements, and a system of sewerage. It was settled in 1760 and chartered as a city in 1849. Population, 1900, 5,501; in 1910, 5,311.

GARDINER, Samuel Rawson, modern historian, born in Hampshire, England, March 4, 1829; died Feb. 23, 1902. He graduated at Oxford, after which he was made professor of modern history in King's College, London. In 1885 he was elected fellow of All Souls', Oxford, for the purpose of pursuing advanced historical studies. While holding that position he devoted much time to writing and preparing extensive treatises in relation to the Civil War and the Commonwealth, and in the meantime edited public documents, family papers, and parliamentary debates. A civil pension was granted him in 1882 by the crown for having made valuable contributions to historical writings, and in 1894 he received the appointment as regius professor of modern history at Oxford. Among his writings are "History of the Great Civil War," "History of England from 1603 to 1642," "The Thirty Years' War," "History of the Commonwealth and Protectorate," and "Cromwell's Place in History." His wife, Bertha Mariton Gardiner, published a manual entitled "The French Revolution."

GARDINER, Stephen, prelate and diplomatist, born at Bury Saint Edmunds, England, in 1483; died Nov. 12, 1555. He studied at Cambridge and became secretary to Wolsey. In 1528 he was sent to Italy to procure the consent of the Pope to the divorce of Henry VIII. from Queen Catherine. Though his mission proved unsuccessful, he rendered important service to Wolsey while in Rome. He tried to convince the king of the impolicy of breaking with the Pope. Edward VI. imprisoned him because he opposed the Reformation, but he was released by Queen Mary, who made him lord chancellor. The persecution of the Protestants is generally ascribed to his counsel.

GARDNER, a town of Massachusetts, in Worcester County, on the Otter River and on the Boston and Maine Railroad. The surrounding country is fruit growing and agricultural. An almshouse, the Levi Heywood Library, a home for the aged, and Crystal Lake Park are noteworthy. Among the manufactures are furniture, ironware, implements, clothing, and machinery. It was incorporated as a town in 1785. Population, 1910, 14,699.

GARFIELD (gär'fēld), a borough of New Jersey, in Bergen County, on the Erie Railway. It is located on the Passaic River, opposite Passaic, and is important as a shipping and manufacturing center. Among its chief industries are chemical works, machine shops, and cotton and woolen mills. It has electric lights, waterworks, and a considerable trade in merchandise. Population, 1910, 10,213.

GARFIELD, James Abram, twentieth President of the United States, born in Orange, Cuyahoga County, Ohio, Nov. 19, 1831; died Sept. 19, 1881. His father, Abram Garfield, came from Massachusetts ancestors, having descended from English Puritans who founded Watertown in 1630. In 1830 his parents moved to Ohio, settling in what is now known as the Western Reserve, where his mother was left a widow with four small children, of whom James was the youngest. His early schooling was obtained during the winter terms in the rural districts, but he made rapid progress by assistance from his mother, and enlarged his knowledge



JAMES A. GARFIELD.

by studious and constant reading. In 1848 he worked as a tow boy on the Ohio Canal, entered Hiram College in 1851, and graduated from Williams College, Massachusetts, in 1856. Soon after he returned to Hiram College as a teacher of Greek and Latin and became president of that institution in 1857. In 1859 he was elected State Senator as a Republican, to represent Summit and Portage counties, and in 1861 organized a regiment of his students and was given charge of a brigade in Kentucky. For marked bravery and superior skill he was promoted to the rank of brigadier general. Among the battles in which he served with distinction are Shiloh, Corinth, and Chickamauga. While serving in Alabama he was appointed chief of staff of the army of the Cumberland and later was made major general of volunteers.

At the request of President Lincoln he resigned his commission in the army on Dec. 5, 1863, and hastened to Washington to take his seat in Congress, to which he had been chosen fifteen months before. His career as a legislator was equally as brilliant as his military record. He was a member of the Committee on Military Affairs, and was chairman of the Appropriation Committee and of the Committee on Banking and Currency. In 1877 he served as a member of the electoral commission and in the same year was elected Senator from Ohio. The convention at Chicago, held in June, 1880, nominated him for President of the United States, and after a hard-fought contest, he secured the election, defeating W. S. Hancock. He served in the Presidency only four months, being shot by an assassin, Charles J. Guiteau, on July 2, 1881, while at the depot of the Baltimore and Potomac Railroad in Washington. After lingering in a weakened condition he died at Elberon, N. J., where he had been conveyed for medical treatment.

The remains were taken to Cleveland, Ohio, at which place an elegant monument was erected to his memory. This memorial, known as the Garfield Monument, is on an eminence in Lake View Cemetery and is 148 feet high. President Garfield was successful in every line of life and always showed a willingness to struggle for merit. However, his political career was marked by severe party opposition and charges of being connected with the famous Crédit Mobilier. His mind was cultured and he always stood for the observance of the law and the advancement of learning. His early success as a teacher led him to be popularly designated "the schoolmaster President."

GARIBALDI (găr-ĭ-bal'dĭ), **Giuseppe,** soldier and patriot, born in Nice, France, July 4, 1807; died in Caprera, June 1, 1882. His busy life was begun as a sailor. He obtained democratic views in politics by coming in contact with Italian liberals at various ports of Italy. In 1834 he joined the movement inaugurated by Mazzini in favor of Italian independence which proved unsuccessful and led to his condemnation to death, but he escaped to France. Later he went to South America to join the army of Uruguay, then fighting for independence. In his struggle in South America he showed much skill as a leader in privateering and while there married a Creole. In 1848 he returned to Italy for the purpose of aiding that country in the common defense against the Austrians. The following year he commanded the combined forces against France and Austria, but was eventually defeated, and sought safety in the United States. In 1854 he returned to Italy, where he purchased the small island of Caprera, off the north coast of Sardinia, on which he made his home. He again took up arms for Italian liberation in 1859, attaining the decisive victories of Marsala and Palermo, and assumed the dictatorship of Sicily.



GIUSEPPE GARIBALDI.

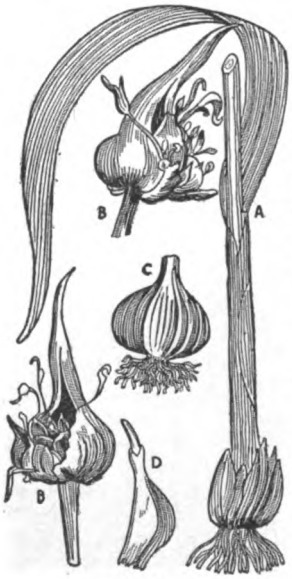
In September, 1860, Garibaldi with a force of volunteers captured Naples, which led to the fear that he would endeavor to attain power over all Italy, but he readily acquiesced in annexing Sicily to Italy, and again retired to private life on his island farm. In 1862 he commanded an unfortunate expedition against Rome, in which he was wounded and captured, but was released soon after. Subsequently he made a journey to England in the interest of Denmark, which proved successful. His last struggle for Italian independence occurred in 1866, when he was defeated at Mentone and held captive in Rome, but soon after escaped and returned in a boat to Caprera. In 1870-71 he aided the French against the allied German army. He became a member of the Italian parliament in 1875. Garibaldi, as a legislator, was radical, as a democratic thinker, studious, and as a republican leader, uncompromising in his efforts to secure Italian independence and the separation of the state from papal authority. There are few, if any, patriots in the history of the world who have been more devoted to the cause of country and more persistent in effort than he.

GARLAND (gär'lạnd), **Augustus Hill,** statesman and jurist, born in Covington, Ky., June 11, 1832; died Jan. 26, 1899. After securing an education, he was admitted to the bar of Arkansas in 1853, and in 1861 became a member of the provisional Congress of the Confederate States at Montgomery, Ala. He was

chosen a member of the first Confederate Congress and later became a Senator of the Confederate States. Though elected a Senator of the United States in 1867, he was not permitted to take his seat. In 1874 he became Governor of Arkansas and two years later Senator of the United States, serving from 1877 to 1885. President Cleveland appointed him Attorney-General of the United States in 1885, in which capacity he served until March, 1889, when he engaged in the practice of law in Washington, D. C.

GARLAND, Hamlin, author, born at La Crosse, Wis., Sept. 16, 1860. His family removed to Iowa and his home was at Hesper, a Quaker community, from which fact many of his tales relate to prairie scenes. He studied at Cedar Valley Seminary, Osage, Iowa, taught in the public schools of Indiana and Dakota, and in 1884 removed to Boston, where his literary career properly began. His first book was published in 1881, entitled "Main-Traveled Roads," for which William Dean Howells wrote an introduction. Other publications include "Wayside Courtships," "A Spoil of Office," "Her Mountain Lover," "Prairie Songs," "Ulysses Grant, His Life and Character," "Trail of the Gold Seekers," "Captain of the Gray Horse Troop," and "Up the Coule."

GARLIC (gär'lĭk), a perennial plant allied to the onion, composed of a compound bulb of ten or twelve smaller ones, called *cloves*. The plant has long pointed leaves, quite narrow and flat, and whitish or pinkish flowers, similar to those of the onion. It is indigenous to the southern part of Europe. In some countries it is cultivated extensively, especially in Portugal, where peasants eat slices of it with bread. Most species have a highly pungent taste and a disagreeable odor. In medicine it serves as a stimulant, expectorant, and diuretic, but its mildness renders it useful as a diet rather than as a medicine.



GARLIC.
A, Stalk; *BB*, Flowers; *C*, Bulb; *D*, Clove.

GARNET (gär'nĕt), a class of minerals, including various species that are prized highly. They occur usually in mica slate or in gneiss, but sometimes in limestone and granite, or in serpentine and lava beds. The three species of garnet which bring the highest prices are known as *alumina garnet, iron garnet,* and *chrome garnet.* These vary in color, such as red, brown, green, black, and yellow, according to the amount of coloring oxides contained in them. Some iron garnet contains enough metal to be attracted by the magnet. Garnets are found in Brazil, Peru, Ceylon, Bohemia, Siberia, and in many mountainous districts, the finest being the Syrian. Garnets which are transparent scarlet and crimson are known as *carbuncles.* A black variety is known as *melanite* and a green kind is called *demantoid.* Common garnet is often powdered and used for cutting and polishing other stone.

GARNET, Henry Highland, Negro clergyman, born a slave in Kent County, Maryland, in 1815; died in Monrovia, Africa, Feb. 14, 1882. He succeeded in reaching the northern states at an early age and engaged as a school teacher in Troy, N. Y. In 1842 he was licensed as a minister of the Presbyterian Church and served as pastor in Troy about ten years. He lectured on slavery in Europe from 1850 to 1853, engaged as a United Presbyterian missionary of Scotland to Jamaica, and shortly after returned to the United States. In 1855 he became pastor in New York City, where he won a large circle of friends. He was chosen president of Avery College in 1869. In 1881 President Garfield appointed him consul general to Liberia, where he died.

GARNISHMENT (gär'nĭsh-mẹnt), a process of attachment whereby a creditor levies upon money or property of his debtor in the possession of a third person. By this process such property is held subject to the payment of a debt, and advantage may be taken of it at the time of beginning a cause or after a judgment has been rendered. The person who is notified to hold such property subject to the order of the court is called a *garnishee.* This process is commonly used in cases where the wages of a debtor are seized to secure payment of a debt.

GARONNE (gȧ-rôn'), a river in the southwestern part of France, rises in the Pyrenees at an altitude of 6,142 feet above sea level and flows toward the northwest, discharging into the Atlantic. It receives numerous tributaries, among them the Save, Lot, Baise, Ratz, and Dordogne, and, after forming a junction with the last-mentioned, is called the Gironde, a distance of about fifty miles, where it constitutes an important estuary. The basin of the Garonne includes 22,050 square miles, is fertile, and contains numerous thriving commercial centers. The Central Canal joins the Garonne at Toulouse and unites it with the Mediterranean Sea, thus forming an important connection between that and the Atlantic. Several other canals join it, one of which crosses the river at Agen by a viaduct.

GARRETT, John Work, financier and railroad president, born in Baltimore, Md., July 31, 1820; died Sept. 26, 1884. He was interested in railroad enterprises and steamboat navigation, serving as president of the Baltimore and Ohio Railroad from 1858 until his death. His son, Robert Garrett, was born in Baltimore, April 9, 1847; died July 29, 1896. He held various offices in the railroad system established by his father, and after the death of the latter succeeded to the presidency. His mind became partially unbalanced on account of the reverses following the purchase of the Baltimore and Ohio telegraph lines by Jay Gould. His sister, Mary Elizabeth, became known as a philanthropist and promoter of higher education among women. She donated liberally to Bryn Mawr College, and in 1892 aided in establishing a medical college in connection with Johns Hopkins Hospital by giving about $300,000.

GARRICK (găr'rĭk), **David,** actor and dramatist, born in Hereford, England, Feb. 20, 1716; died Jan. 20, 1779. He was educated at the grammar school of Lichfield. In 1735 he took a course of six months under Samuel Johnson, and shortly after both teacher and pupil settled at London. Garrick studied law and engaged as a wine merchant, but soon after went upon the stage and began to play as a professional actor in 1741. His early successes caused him to appear in London, where he played successfully in the character of *Richard III.*, and soon after attained success by attracting the attention and applause of large audiences. He became manager of Drury Lane Theater in 1747, two years later married Mlle. Violetti, an actress from Vienna, and continued to direct the Drury Lane entertainments until he retired from the stage in 1776. A trip to Italy in 1763 was the only vacation period taken from his busy field of labor. Garrick ranks as one of the most noted English actors.

GARRISON, Lindley M., public man, born at Camden, N. J., Nov. 28, 1864. His father, Joseph F. Garrison, was an Episcopal clergyman. He acquired a liberal education and became a successful lawyer. In 1904 he was made vice-chancellor of New Jersey and was reappointed for a term of seven years in 1911, but resigned in 1913 to enter the Cabinet of President Wilson as Secretary of War. He resigned this office in 1916.

GARRISON (găr'rĭ-sŭn), **William Lloyd,** journalist and abolitionist, born in Newburyport, Mass., Dec. 10, 1805; died in New York, May 24, 1879. He was apprenticed to a shoemaker at Lynn in 1814, but soon after entered school at Newburyport, where he worked out of school hours to pay his expenses. He commenced to learn cabinetmaking in 1818, but some time after engaged as printer on the Newburyport *Herald*, and when only sixteen years old began to arouse interest by writing on the slavery question. He became editor of the *Herald* in 1824 and was among the first to publish poems from the pen of Whittier. Later he edited the *Free Press,* and in 1827 conducted the editorial work on the *National Philanthropist,* the first temperance journal published in America. In 1829 he aided in organizing the *Genius of Universal Emancipation,* a periodical issued at Baltimore, in which he denounced the slave trade in such outspoken words that he was imprisoned for libel. After being released, he went on the platform as an antislavery orator, founded the *Liberator* in 1831, and the next year established the American Anti-Slavery Society, of which he afterward became president. He visited European countries on a lecturing tour, where he was welcomed by many of the liberal thinkers. His "Thoughts on African Colonization," published in 1832, extensive lectures, and editorial work had a marked influence upon public opinion regarding slavery. The principles advocated by him rapidly gained in popularity until in 1865, when slavery was abolished and the Anti-Slavery Society dissolved. His friends presented him with $30,000 in recognition of valuable service. A number of poems and selections were published by him.



WILLIAM LLOYD GARRISON.

GARROTE (găr-rōt'), a method of execution practiced by the Spaniards. It is a form of strangulation and was originally performed by placing a heavy cord around the neck of a criminal, who was seated on a stool fastened to a stake, and the cord was twisted by inserting a stick between the rope and the back of the neck, then twisting until strangulation took place. Another method was by means of a brass collar placed around the neck, and pressure was obtained by means of a screw. The garrote was used extensively during the Inquisition. The name is sometimes applied to a species of robbery in which the victim is surprised by the highwaymen, who produce temporary strangulation by drawing a cord or handkerchief about the neck, when the pockets are rifled.

GARTER, Order of the, one of the most celebrated and ancient orders of knighthood. It was probably originated by Edward III, about Jan. 18, 1334, and served to reward the distinguished military personages who assisted in the struggle against France, though its founding is sometimes assigned to Richard I. It is related that Edward III. was dancing with the

Countess of Salisbury when her garter dropped, and, after putting it around his own leg, restored it with the expression of "Dishonored be he who thinks evil of it," which was afterward changed slightly to form the motto of the organization. Numerous revisions of the statutes of the order were effected in the reigns of Henry V., Henry VIII., Edward VI., and in 1805 under George III.

Originally there were 26 knights, inclusive of the sovereign, who was the recognized head. The statute passed in 1786 recognized and maintained this number, but admitted as supernumerary members certain of the princes. The common title of the order was *Order of Saint George* prior to the reign of Edward VI., and the same term is still applied synonymously with that now used. A dark blue ribbon, edged with gold, is used to represent the garter as the emblem. On it the motto appears, *Honi soit qui mal y pense* (Shame to him who thinks evil), together with a buckle and pendant. It is worn below the knee of the left limb. However, there are other marks of distinction, such as a hood, mantle, gown, plume, star, ribbon, golden collar, and a figure of Saint George on horseback in contact with the dragon. The members use the initials K. G. to designate the order, which are written after their names. From some authorities we learn that ladies were members prior to the reign of Edward IV. The Prince of Wales is a member by virtue of his title.

GARTER SNAKE, the name applied to various small snakes of North America. The common garter snake is found widely distributed from Mexico to Canada, but in appearance the species vary somewhat. Most of them are brown or black, and those of the warmer section have spots or crossbars, while the species common to the colder regions are striped with greenish color.

GARY, a city of Lake County, Indiana, 22 miles south of Chicago, on the Pennsylvania, the Wabash, and other railroads. It has extensive foundries, machine shops, cement works, steel and iron industries, car shops, and gas and locomotive works. The features include interurban railways. It was settled and incorporated in 1906. Population, 1910, 16,802.

GARY, James Albert, business man, born in Uncasville, Conn., Oct. 22, 1833. He descended from Puritan ancestors, settled in Maryland in 1840, and was educated at Rockhill Institution and Allegheny College. He entered a partnership with his father in the milling business in 1861 and on the death of the latter, in 1870, succeeded to the head of the business at Alberton, Md. At the time of the Civil War he was an ardent supporter of the Union. He attended many of the national Republican conventions, serving on the general committee of that party. President McKinley appointed him Postmaster-General in 1897, but he resigned the following year, being succeeded by Charles Emory Smith.

GAS, one of the three forms of matter, the other two being *solids* and *liquids,* and which constitutes a fluid that cannot be liquefied nor solidified at ordinary temperatures and pressure. Air was practically the only gas known to the ancients, but artificial gas was referred to as *spiritus* by writers as early as the 14th century A. D. The term gas soon came to be applied to all elastic fluids that differ from common gas, and which were thought to be permanent. However, Faraday liquefied various gases by reducing the temperature and increasing the pressure, and since then the term has been applied generally to all substances in an elastic aëriform state. Experiments in liquefying gases have established the fact that none is permanent, and that even air may be reduced to a liquefied state, this being first demonstrated in 1878. To reduce a gas to a liquid state it is necessary to make application of cold or pressure, or a combination of both. The point at which the distinction between a gas and a liquid is lost is called the *critical point of temperature,* and there is a particular temperature for any given pressure at which the critical point of temperature can be reached. It is only at or below this particular temperature that pressure converts a gas into a liquid.

Gases are generally distinguished from liquids by the term *elastic fluid,* while liquids are termed *nonelastic fluids,* this being due to the circumstance that liquids have comparatively little or no compressibility. Though all liquids have elasticity, they expand after compression is removed to their former state, while gases expand to an indeterminable extent and in every direction when left unconfined. As a general rule the density of a gas depends upon the pressure to which it is subjected, or, in other words, an increase of pressure reduces the volume of gases proportionally. This is in accord with the law announced by Edme Mariotte (1620-1684), a French physicist, which is substantially as follows: *The volume of a given mass of gas varies inversely with the pressure to which it is subjected.*

Two or more gases brought into contact mix in any proportion and diffuse themselves uniformly regardless of their gravities. This may be verified by filling a bottle with hydrogen and another with oxygen, whose specific gravity is sixteen times that of hydrogen, or with carbonic acid, whose density is twenty-two times as great, and connecting the two bottles with a glass tube about ten inches long. Diffusion of the gases will begin at once, and within a few days they will be found to have the same proportion to each other in both bottles, even if a porous substance, as a thin membrane, be placed in the tube. The kinetic theory of gases accounts for the power of motion inherent in all parts of aëriform matter. According to it a

gas consists of molecules sparsely distributed through space, but which move about with much velocity. An increase of temperature has the effect to greatly increase the molecular energy, when the pressure within the vessel will be increased correspondingly, while lowering the temperature has an opposite effect.

Gas is a valuable agent in lighting, heating, and for various other purposes in the arts and industries. Large quantities are derived from natural sources, but the greater supply is obtained from coal, wood, resin, peat, water, coke, oils, and fats. In many localities gas issues from the surface of the earth, as in Pennsylvania, Texas, Ohio, New York, and various parts of Eurasia, especially at Baku, and is now used very extensively for illuminating and heating purposes. The Chinese have utilized gas for centuries in various industries and even transported it to different parts of their own country, which they did in ancient times by confining it in bamboo tubes. It may be said that the artificial manufacture of gas in Europe dates from 1739, when an inflammable gas was obtained in England by subjecting coal to heat in a closed vessel and conducting the fluid through a small tube into bladders. A simple experiment consists of placing particles of bituminous coal in the bowl of a tobacco pipe, then closing the top with moist clay and heating to a red heat. When reaching the point of distillation, a yellowish smoke issues from the stem of the pipe, which yields a bright flame when lighted.

In the manufacture of coal gas the coal is placed in an iron or clay retort, in which it is heated until it expands to twice its bulk and forms coke, while the gas generated is conducted by a pipe into a receiver. The tanks used in factories have a large capacity, some having storage room for 3,000,000 cubic feet of gas. In distilling the coal it gives off heat, steam, ammonia, tar and gas. The ammonia and tar are run off into cisterns, while the gas is passed over lime before running it into gas storage tanks for the purpose of freeing it from acids.

In an analysis made by Robert W. Bunsen (q. v.) it was found that the products of the destructive distillation of bituminous coal include the following: Coke, sixty-eight per cent.; tar, twelve; water, eight; marsh gas, seven; carbonic oxide, one; and carbonic acid, one. In addition to these are generated small quantities of olefiant gas, hydrogen, ammonia, and nitrogen. Coal gas is used largely for heating and lighting, and for that purpose is passed to houses and factories by pipe lines. Small pipes carry the gas to lamps and burners in different parts of the buildings. A gas meter, through which the gas passes, is usually in each building, and the quantity consumed is measured quite accurately.

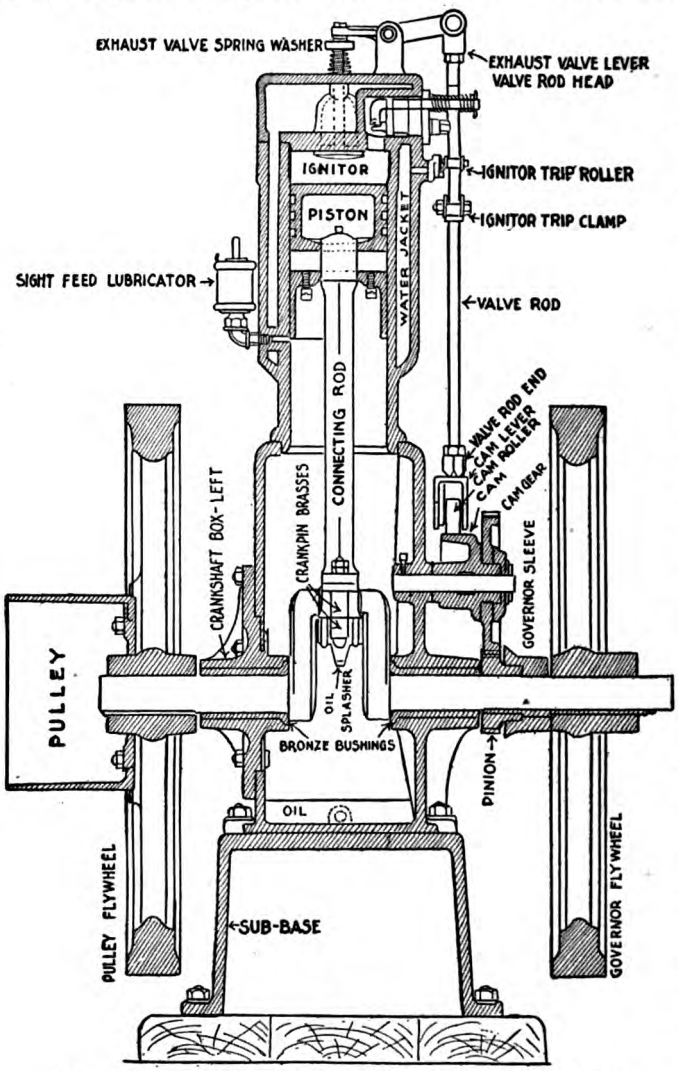
Wood gas contains more illuminating power than olefiant gas and its specific gravity is greater than coal gas, hence, it requires burners with larger orifices. *Resin gas* has a high illuminating power, but the supply is necessarily limited. *Peat gas* is distilled in retorts similar to those used in wood gas. *Water gas* is made by forcing steam and the vapor of crude petroleum into retorts, which are subjected to a high temperature. This product is cheaper and more satisfactory for illuminating than coal gas. *Oil gas* is obtained by dry distillation, or by running oil or petroleum through tubes which have been raised to a red heat. This gas, stored in cylinders and subjected to pressure, is used generally in lighting railway cars. Crude petroleum is used extensively in making gas for illuminating purposes. See **Natural Gas; Acetylene.**

GASCONADE (găs-kŏ-nād'), a river in Missouri, rises in Wright County, and flows in a general course toward the northeast. It discharges into the Missouri River at Gasconda, about 35 miles below Jefferson City, after a course of 250 miles. The basin includes a large portion of the slopes of the Ozark Mountains and the course of the river is quite tortuous.

GASCONY (găs'kŏ-nĭ), or **Gascogne,** a former duchy in the southwestern part of France. It was bounded by the Bay of Biscay, the Pyrenees, and the Garonne River, corresponding to the present departments of Gers, Landes, and Hautes-Pyrénées and portions of four other departments. The inhabitants were generally known as Gascons, who descended from the Goths and the Basques. They submitted to the Franks in 1602, but maintained a semi-independent government, and later were conquered by Pepin. The region was a possession of England from 1152 until 1453, when it was reconquered by France.

GAS ENGINE, an engine in which the motion of the piston is produced by the combustion or sudden production or expansion of gas. Machines of this kind now in extensive use receive their motion by an explosive mixture of gas and air being forced into the working cylinder and ignited there by a gas flame or an electric spark. The largest number are *gasoline engines,* in which gasoline gas produces the motion, but natural gas, illuminating gas, and gas from naphtha or other petroleum products are employed. These engines vary in construction and efficiency, ranging from very small machines to those having a capacity of 650 horse power. Besides having valves for the admission and escape of gas from the cylinder and igniting apparatus, they possess the essentials of the steam engine, having a piston within the cylinder, a connecting rod, a crank, and a fly wheel. Motion is induced by admitting gas into the cylinder, where it is exploded by an electric spark, causing the piston to be thrown forward, which acts to cause a partial vacuum within the cylinder, into which more gas is

admitted, which, on being exploded, causes another forward movement of the piston. The burned gas escapes at the return of the piston, when the exhaust valve is thrown open. The movement would be irregular and ineffective without a fly wheel, which moves rapidly and maintains uniformity in the rate of speed. The inflow of gas, as the intake valve is thrown open, is regulated by a governor attached to the fly wheel. Gas engines are used extensively where power is required periodically, especially in such structures as motor bicycles, automobiles, hoisting machines, yachts, etc.



Sectional view of a Vertical Gas Engine, showing working parts.

GASKELL (găs'kĕl), **Elizabeth Cleghorn,** novelist, born in Chelsea, England, Sept. 29, 1810; died Nov. 12, 1865. In 1832 she married William Gaskell, a Unitarian minister. Her writings include "Mary Barton," "Wives and Daughters," "Round the Sofa," and "Life of Charlotte Brontë."

GASTONIA, a city of Gaston County, North Carolina, on the Southern and other railways. It has paving, sanitary sewers, electric lights and railways, cement works, and cotton manufactures. The features include the federal building. It was settled in 1873. Population, 1910, 5,759.

GASTRIC JUICE (găs'trĭk), a colorless liquid secreted by the stomach, containing 98.5 per cent. of water. It has a salty, acid taste, the active principle being pepsin. The function of gastric juice is to dissolve the nitrogeneous elements of food, such as albumen, fibrin, and casein. It affects portions of the vegetable food and all animal food, except fat, converting them into what is known as *peptones.* The acid in some cases seems to be largely of a hydrochloric nature. In others hydrochloric and lactic, or even butyric and acetic acids are present, but they are thought to be due to the change undergone by the food in the process of digestion. When the food has been thoroughly mixed with the liquid of the stomach, it is known as *chyme,* which passes into the intestines as a thick but sticky substance. About fourteen pounds of gastric juice are secreted daily in the human adult. Artificial gastric juice can be made by extracting pepsin from the coat of the stomach of animals by means of glycerin, and adding water to the filtered liquid, with a small per cent. of hydrochloric acid.

GASTRITIS (găs-trī'tĭs), an inflammation of the stomach, especially of the mucous membrane of that organ. The early symptoms include a pain in the stomach and a severe headache, which are usually followed by fever and nausea. A common form is known as acute catarrhal gastritis, which is usually due to careless dieting. Toxic gastritis is caused by an excessive use of stimulants, especially alcohol. An acute and persistent form is known as chronic gastritis, which causes a general decline of health. Wholesome exercise and careful dieting are recommended in all forms of this disease.

GASTROPODA (găs-trŏp'ō-dà), a class of mollusks that have a distinct head, bearing eyes and tentacles, and movement is by means of a

large creeping disk or foot. In most species the body is not symmetrical, but the head and foot are usually well formed. All the species have a more or less clearly defined hump upon the back, which is extended in some to a considerable size, and in it are contained the visceral masses, including the stomach, circulatory organs, and the glands of reproduction. The shell is single or univalve, usually coiled in a spiral. The greater number of mollusks with univalve shells belong to this class, but it also contains some species with multivalve shells, such as the chitons. Among the species of gastropods are the limpets, snails, slugs, and cowries.

GATES, Horatio, American general, born in England in 1728; died in New York City, April 10, 1806. In 1755 he came to America, serving as captain in Braddock's expedition, and was severely wounded in the engagement that followed. In the early Revolutionary movements he became a prominent factor for American independence, when he was appointed adjutant general in the colonial army, and gained a decisive victory over the British at Saratoga in 1777. This success was followed by the surrender of Burgoyne, and is classed by Edward S. Creasy (q. v.) as one of the great battles treated in his "Fifteen Decisive Battles of the World." Though he managed the campaign with much ability, at least a part of the glory belongs to Schuyler. Shortly after he became implicated in the Conway Cabal, whereby he hoped to secure general command of the colonial army, a position held by Washington. The design was discovered and he was relieved of his command until 1780, when he was made a commander of the Southern forces and sustained a severe defeat at Camden, on August 16. This led to his retirement, and a court-martial, after investigating his conduct, did not acquit him from blame for the defeat until in 1782. In 1784, after freeing his slaves, he settled in New York City, where he resided until his death.

GATES, Sir Thomas, Colonial Governor, probably born at Colyford, England; died about 1621. He entered the army at an early age, but little is known of him until 1609, when he was named in the second charter of Virginia. It is certain that he promoted the organization of the Virginia Company and that he saw active military service in the Netherlands. In 1609 he sailed as first Deputy Governor of Virginia with 500 colonists for America, but was wrecked on the Bermudas, where two vessels were constructed to enable the colonists to proceed. They left the Bermudas in 1610 and reached Jamestown, Va., in May, when the colony was short of provisions. The colonists became dissatisfied and induced Gates to return to England, but at the mouth of the James River they were met by Lord Delaware, who became Governor of the colony. In the same year Gates went to England to obtain recruits and supplies, and returned with 300 colonists in 1611. He remained in Virginia until 1614, when he returned to England.

GATH, one of the five chief cities of Philistia, frequently mentioned in the Bible in connection with David and the Jews. Goliath, who was slain by David, lived in Gath. It was alternately independent or under the power of the Jewish Kings, except for the short period when it was under Syrian rule. The Philistines defended it against David and Solomon, and it still remained a center of influence until the time of Jerome. It is not known where Gath was, but it is thought to have been located between Ashdod and Ekron.

GATINEAU (gă-tē-nō′), a river in the province of Quebec, Canada, the largest tributary of the Ottawa. It has its origin in a number of lakes, flows in a general southerly direction, and enters the Ottawa River about a mile below the city of Ottawa. It receives a number of tributaries and is about 400 miles long. Only a short distance is navigable, but it is utilized extensively in rafting timber and lumber.

GATLING (găt′lĭng), **Richard Jordan,** inventor, born in Hertford County, North Carolina, Sept. 12, 1818; died Feb. 26, 1903. He turned his attention to inventions at an early age, completing a screw for propelling steamers in 1838 and later a seeder for sowing wheat and rice. In 1850 he invented a hemp brake, a steam plow in 1857, and later a machine for transmitting power by means of compressed air. His invention of the revolving battery that bears his name is the most noted of his productions. It consists of a number of breech-loading rifled barrels constructed to revolve around a common center. Cartridges are supplied by an ingenious device, making it possible to fire 1,200 shots per minute from a ten-barreled gun. The United States adopted it in 1866, and it has since been used by several European governments. Among his more recent inventions are a torpedo and gun boat, an improved method for casting large steel cannon, and a superior pneumatic gun for discharging high explosives.

GATSCHET (gä-shā′), **Albert Samuel,** philologist and ethnologist, born in Saint Beatenberg, Switzerland, Oct. 3, 1832; died March 16, 1907. He first studied in Neuchâtel and afterward at the universities of Bern and Berlin, and spent some time in a research of the etymology of Swiss dialects. His investigations led to the publication of a work in German entitled "Research of Rock Ethnology." He removed to the United States in 1868 and served as editor of various German newspapers, and in 1877 was appointed ethnologist of the government geological survey. In 1874 he began an extensive study of the languages of the Indians, for which purpose he visited settle-

ments of native tribes in different sections of the country. For some time he was connected with the Smithsonian Institution. His publications include "Indian Languages of the Pacific States and Territories and of the Pueblos of New Mexico," "Twelve Languages of the Southwestern Part of North America," "Liberality of Aboriginal American Literature," "Analytical Report of Indian Dialects Spoken in Southern California, Nevada, and on the Lower Colorado River," and "People and Language of the Timucua Tribes."

GAUCHOS (gou'chōz), the name of a nomadic class of people in South America, confined largely to Argentina and the Pampas in the basin of the La Plata River. They descended from whites and Indians, are tall and handsome, and engage chiefly in stock raising. They are skilled in using the lariat. The Gauchos are good horsemen and are independent and warlike.

GAUGE (gāj), or **Gage,** the name of many instruments used in the mechanical arts. The distance between the inner sides of the rails of a track is known as the gauge of railways and to ascertain it an instrument known as a *gauge* is used. It serves to set the rails to the proper space apart and to measure the distance when the rails require adjustment. An instrument known as a *steam gauge* is fixed to the boilers of engines, serving to register the force of the steam. It consists of a cylindrical box of metal furnished with a dial and the force is indicated by a needle, which is moved by a spring according to the pressure of the steam, which acts through a tube upon a movable piece of metal attached to the spring. The spring is compressed according to the pressure of the steam, and the needle indicates on the dial the pressure per square inch in pounds. A *water gauge* is one to indicate the level of the water in a boiler. It consists of a vertical glass tube, which communicates at both ends with the boiler, hence the water in the tube will rise to the same level as that in the boiler. Some boilers are provided with *gauge cocks* in addition to the vertical gauge.

GAUL, or **Gallia,** the name applied anciently to the country situated between the Rhine and the Pyrenees, which was the region occupied chiefly by the Gauls, the most numerous branch of the original Celts. The principal divisions of the region consisted of the district on the Roman side of the Alps and the one beyond the Alpine Mountains. In the course of time the former became known as *Gallia Cisalpina,* and the latter as *Gallia Transalpina,* though each was variously modified in extent by the fortunes of war and insurrectional disturbances. The Gallic people were first brought into history about 397 B. C., when they crossed the Alps and engaged in a series of wars with the Etruscans and Romans. In 390 B. C., they inflicted a defeat upon the Romans at Allia, burned a large part of Rome, and planted their authority far toward the East.

In 280 B. C., the Gauls conducted successful compaigns into Greece, penetrated across the Hellespont into Asia Minor, and made important settlements under the name of Galatians, with which the early Christian teachers came in contact. Their foothold along the Danube was lost as a result of the conquest of the Germanic peoples, who occupied the entire region tributary to the Rhine. The Cisalpina Gauls were prominent factors in contending against Roman power until the first Punic War, when an armed conflict of six years' duration compelled them to submit to the Roman authority, in 220 B. C. The march of Hannibal across the Alps to reduce Rome gave them an opportunity to again rise with prospects of success, but, when the Carthaginians were defeated by the Romans, the Gauls were again reduced to submission. A Roman invasion in 128-122 B. C. reduced and made them tributary, the Romans establishing Provincia, a name since perpetuated as Provence. Later the successful incursions of Germanic and Cimbrian armies tended still further to reduce the Gallic tribes, and they were ultimately subdued by the Romans in a war lasting nine years, conducted under the proconsulship of Julius Caesar, from 58 to 50 B. C.

GAUR (gär), or **Gour,** a wild ox native to Southern Europe, found chiefly in India. It stands about five feet high at the shoulders, has strong and much curved horns, and is one of the largest species of the ox tribe. The color is brown or blackish, except the legs below the knee, which are white. The hide is very thick and is used in making shields.

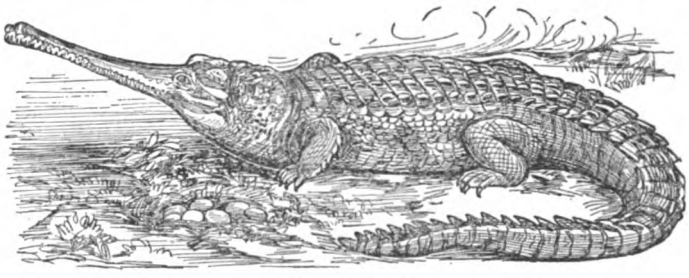
GAUTIER (gō-tyā'), **Theophile,** poet and novelist, born at Tarbes, France, Aug. 31, *1811:* died Oct. 23, 1872. He studied at the *College* of Charlemagne and became an artist, but soon gave attention to literature. In 1830 he published a volume of poems written in the style of the romantic school, with which he was classed. He became editor of the *Journal Officiel* in 1869, in which he published many literary criticisms. The style of his writings is clear and interesting. Among his works are "Journeys in Spain," "Handsome Jenny," "Captain Fracasse," "Enamels and Cameos," and "History of Dramatic Art in France."

GAVARNI (gà-vär-nē'), the assumed name of Sulpice Paul Chevallier, artist and caricaturist, born in Paris, France, Jan. 13, 1804; died Nov. 24, 1866. He began the study of architecture at an early age and took up the work of mechanical drawing. In 1828 he received orders to draw illustrations for several periodicals at Paris. In the meantime he illustrated a number of works for Balzac and other writers, including Sue's "Wandering Jew." For several years he contributed caricatures to the *Charivari* in Paris. In 1847 he went to London, where he received employment and at the same

time contributed to periodicals in France. Few caricaturists have excelled him in ability to amuse the public with humorous drawings which illustrate important political events or personages.

GAVAZZI (gä-vät'sē), **Alessandro,** patriot and evangelist, born in Bologna, Italy, March 21, 1809; died in Rome, Jan. 9, 1889. In 1825 he entered the order of Barnabites and became professor of rhetoric in the University of Naples, where he gained a reputation as an orator. Soon after he was made chaplain general of the liberal forces by Pope Pious IX. Later the Pope joined the reactionaries and recalled the Roman legion from Vicenza, which caused Gavazzi to seek safety in Genoa. When the republican government was established, the Pope fled from Rome and Gavazzi returned, but escaped to London when the French captured Rome in 1842. While in England he lectured against Romanism. Subsequently he visited the United States and Canada, where his orations against the Roman government gave rise to numerous riots. In 1860 he joined Garibaldi in his efforts to establish the Free Church in Italy, revisited England in 1870, and made an extensive tour of the United States in 1873. Among his publications are "Recollections of the Last Four Popes," "New Union with Rome," and "The Priest in Absolution."

GAVIAL (gā'vĭ-ạl), or **Gharial,** a species of crocodile native to Southern Asia, found chiefly in the region of the upper Ganges and its tributaries. It is peculiar for its long and narrow jaws, which have numerous sharp and slender teeth. The food consists principally of fish and small reptiles. An adult gavial is about twenty feet long. The male has a large hump upon the snout, formed of cartilage, and in this the nostrils open. Though closely allied to the crocodile and alligator, it has a much narrower and feebler jaw.



GANGES GAVIAL.

GAY, John, poet and dramatist, born in Devonshire, England, in 1685; died Dec. 4, 1732. He descended from an ancient family, was apprenticed to a London silk mercer, and in 1711 published a descriptive poem dedicated to the Pope. Among his productions are numerous operas, sonnets, and oratorios, the most celebrated being the "Beggar's Opera," which was given 63 nights consecutively with excellent effect. Among other productions are "Wife of Bath," "Three Hours After Marriage," "Black-Eyed Susan," and "Polly." His works were not only popular, but brought good returns to the author, "Polly" alone netting him $6,000.

GAY, Sidney Howard, journalist and author, born in Hingham, Mass., in 1814; died June 25, 1888. He studied at Harvard University, but left that institution before graduating, and for some time worked in an accounting house in Boston. Later he studied law and engaged as a lecturer for the American Anti-Slavery Society. Subsequently he took up editorial work as writer on the New York *Tribune* and later on the Chicago *Tribune.* In 1872 he became a member of the editorial staff of the New York *Evening Post.* He assisted William Cullen Bryant in writing "Life of James Madison" and independently published "A Popular History of the United States."

GAY-LUSSAC (gā lü-sȧk'), **Louis Joseph,** chemist and physicist, born at Saint Léonard, France, Dec. 6, 1778; died May 9, 1850. He studied at the Polytechnic School, Paris, and became an assistant to Berthollet in the government chemical works at Arcueil. In 1804 he made two famous balloon ascensions to observe the variation in altitude with magnetic intensity, attaining to the height of 23,000 feet, and in the same year demonstrated that oxygen and hydrogen unite to form water in the proportions by volume of one of the former to two of the latter. From this discovery it was ascertained that gases combine uniformly in definite proportions by volume. In 1805 he accompanied Humboldt on a scientific tour through Southern Europe, and subsequently published a series of useful reports of numerous discoveries in chemistry. He was awarded many medals and received honors from numerous scientific and educational associations. The results of his discoveries were published by him in *Annals of Chemistry,* of which he was joint editor for nearly thirty years.

GAZA (gā'zȧ), a town of Syria, three miles from the Mediterranean, and fifty miles southwest of Jerusalem. It occupies an important position on the caravan road between the desert and the Mediterranean, hence has been important as a trade center from remote antiquity. The Egyptians were an important factor in extending its commercial influence, but it was conquered by the Philistines and became their most important city. Alexander the Great captured it after a siege of two months, in 332 B. C., and its final destruction, which occurred in 96 B. C., is referred to in Acts viii., 26. The

Romans rebuilt it, but it was more distinctly a Greek city, and for a long time rivaled Athens and Alexandria in culture. Omar captured and destroyed it in 634, but it was rebuilt by the Crusaders and defended by the Templars. The modern city is known as Ghazzeh. It has a considerable trade, but the buildings are poorly constructed. It was captured by the British under General Allenby in 1917. Population, 1916, 37,280.

GAZELLE (gȧ-zĕl′), the type of antelopes, including about twenty species, most of which frequent desert and mountain regions. They are found mostly in North Africa, Persia, and Arabia. The various species are gentle in disposition, light fawn colored, and have lustrous eyes. Both sexes have horns. The gazelle is preyed on by the lion and hunted for its flesh and hide. Though gregarious in habits, they are shy and difficult to approach. The *admi,* or mountain gazelle, is a familiar species of the Sahara highlands. Other well-known species include the *dama* of the Sudan, the *Loder's* of Algeria, and the *common gazelle* of Arabia.



GAZELLE.

GEAR, John Henry, statesman, born in Ithaca, N. Y., April 7, 1825; died July 14, 1900. In 1838 he removed to Iowa, engaged in business at Burlington in 1843, and became mayor of that city in 1863. Subsequently he was elected to the General Assembly of the State three different times, and served as speaker of the House two terms. In 1878-82 he was Governor, being elected as a Republican. He was elected to Congress in 1886, to which position he was reëlected in 1888 and 1892. On account of his eminent service in the House, he succeeded to the election of United States Senator in 1895. He was reëlected to the Senate in 1900, but died before entering upon the service of the second term, and was succeeded by J. P. Dolliver.

GEARING (gēr′ĭng), the name applied to a set or system of wheels in machinery, constructed so motion is communicated from one part of the machine to another. A gearing usually consists of a train of friction wheels, screws, or toothed wheels, and frequently of a series or combination of them. A machine is said to be *out of gear* when all parts are not adjusted for communication and *in gear* when it is set ready for use. The velocity of a machine depends upon the construction of its gearing, which may be so adjusted as to increase or diminish the speed of the part which does the work. Gear wheels are of various forms, depending upon the velocity desired and the nature of communicating motion. A *beveled gear wheel* has teeth set radially in the face of a cone, while a *spur gear wheel* is one in which the teeth are parallel to the axis of the wheel. In a *worm wheel* the teeth are cut spirally, hence have the effect of a screw.

GEARY (gā′rĭ), **John White,** soldier and statesman, born near Mount Pleasant, Pa., Dec. 30, 1819; died in Harrisburg, Feb. 8, 1873. After studying civil engineering and law, he enlisted in the Mexican War, attained the rank of lieutenant colonel for valuable service rendered in the field, and was made the first commander of the City of Mexico and colonel of his regiment. He was appointed first postmaster of San Francisco in 1849, became mayor of that city in 1850, and was made territorial Governor of Kansas in 1856. When the Civil War commenced, he raised the twenty-eighth Pennsylvania volunteers, commanding in the battles of Chancellorsville, Gettysburg, and Lookout Mountain, and accompanied Sherman on the march to the sea. By reason of distinguished service he succeeded to the rank of major general. He was elected Governor of Pennsylvania as a Republican in 1866, which position he held until within two weeks of his death.

GEBER (gā′bēr), **Abu-Musa,** chemist, born in Thus, Persia. He is sometimes spoken of as the father of chemistry. Cardan considered him the greatest genius of the Middle Ages. His works, only fragments of which remain, treat of the nature, fusion, purification, and malleability of metals. They make it certain that he understood the processes of distillation of liquids and the construction of various kinds of furnaces. A large number of works attributed to him are extant, some of which are in the libraries of Berlin, Paris, and Leyden.

GEBHARDT (gĕp′härt), **Eduard von,** historical painter, born at Saint Johannes, Russia, in 1838. He studied at the Academy of Saint Petersburg and at the School of Art in Karlsruhe, Germany, and settled permanently at Düsseldorf. In 1873 he was made professor at the Academy of Düsseldorf, where he began

a long line of successful work as an historical painter. In 1886 he was awarded the great gold medal at the Berlin Exhibition. His works consist principally of historical paintings, but he produced many excellent portraits. Among his productions are "Christ on the Cross," Jacob and the Angel," "Reformer at Work," "Entry of Christ into Jerusalem," "Ascension of Christ," "Sermon on the Mount," "Healing of the Palsied," and "Scenes from the Life of Christ."

GECKO (gĕk'ō), the common name of an extensive family of lizards. They are small animals, seldom exceeding eight inches in length, and the body is covered with numerous round warts. The head is flattened, the body is short and thick, and the eyes are large. The species vary greatly in color, which is usually quite dull. Formerly it was thought that their bite is poisonous, but such is not the case. On the other hand, they are entirely harmless, and are useful in feeding upon insects and worms. They are found quite frequently in cellars and under wet boards and logs. Species closely related are common to all the continents.

GEDDES (gĕd'dĕs), **Patrick,** educator, born in Perth, Scotland, Oct. 2, 1854. He studied at University College, London, and afterward took courses at the Sorbonne, Paris, and the University of Edinburgh. Subsequently he became teacher of natural history in Aberdeen, and afterward was lecturer on the same branch in the School of Medicine in Edinburgh. He was a student of Celtic literature and was progressive as an educator. "Chapters in Modern Botany" and "The Evolution of Sex" are his two chief publications.

GEHENNA (gē-hĕn'nȧ), in Hebrew, the valley of Hinnom, a gorge with precipitous and rocky sides, situated a short distance southwest of Jerusalem. The Jewish kings made it a favorite place for the celebration of religious ceremonies and idolatrous rites. When the pure religion of the fathers was restored in the reign of King Josiah, he defiled the valley in making it a charnel district by covering it with the sewage of the city. It was common to burn the offal and carcasses of animals in order to make the place one of disagreeable repute and thereby destroy it as a resort for idol worship.

GEIBEL (gī'bęl), **Emmanuel,** poet, born at Lübeck, Germany, Oct. 17, 1815; died April 6, 1884. He graduated at Bonn in 1836, was a tutor at Athens several years, and traveled for some time with Ernst Curtius in Southern Europe. In 1843 he received a pension from the King of Prussia and later was professor of aesthetics at Munich. He took up his residence at Lübeck in 1868 and resided there the remainder of his life. His writings include a number of lyric poems. With Ernst Curtius he published "Classical Studies," and joined Paul Heyse in writing "Romances of the Spaniards and Portuguese." Among his independent works are "Brunhilde," "Autumn Leaves," "New Poems," and "Poems and Reminiscences."

GEIJER (yī'ȧr), **Eric Gustaf,** poet and historian, born in Wermland, Sweden, Jan. 12, 1783; died April 23, 1847. He studied at the University of Upsala and in Stockholm, and later secured a professorship of history in the former. Besides efficiently instructing the university classes, he was a prolific writer of political essays and poems, lectured extensively, and completed numerous musical compositions. In his historical researches he was supported liberally by persons of influence, and exhibited much resource and method in collecting information, though his writings are confined largely to Scandinavian countries. Among his most celebrated works are "Swedish National History," "Gustaf III.," and "Collected Works." The last named constitutes a general collection and was published since his death by his son, together with biographical sketches.

GEIKIE (gē'kĭ), **Sir Archibald,** geologist, born in Edinburgh, Scotland, Dec. 28, 1835. He graduated at the University of Edinburgh and soon after became director of the survey in Scotland. In 1871 he was made professor of geology and mineralogy in the University of Edinburgh, in which position he was succeeded by his brother, James Geikie, in 1882. Later he held a similar position in the Museum of Practical Geology in London. He was one of the founders of the Royal Scottish Geographical Society and was honored by membership and official position in numerous British and foreign scientific societies. He lectured extensively in Canada and the United States, and in 1897 delivered a series of lectures at the Johns Hopkins University. His writings include "Field Geology," "Ancient Volcanoes of Britain," "Landscape in History," "The Founders of Geology," and "Life of Sir Roderick I. Murchison."

GEISSLER (gīs'lēr), **Heinrich,** physicist, born in Igelshieb, Germany, in 1814; died Jan. 24, 1879. He learned the art of a glass blower, traveled several years, and finally settled at Bonn, where he established a factory for making chemical and other scientific apparatus. He is best known as the inventor of the sealed glass tubes known as Geissler's Tubes, by means of which are exhibited the phenomena accompanying discharges of electricity through highly rarified vapors and gases. These tubes consist of glass tubes and bulbs, each tube having a platinum wire, which serves as an electrode, and brilliant effects are produced when they are connected with an electric machine. Among other apparatus contrived by him are his normal thermometer, aërometer, and mercury air pump. The last mentioned is an apparatus used to produce an extremely high vacuum.

GELÉE (zhę-lā'), **Claude.** See **Claude Lorraine.**

GELSENKIRCHEN (gĕl'zęn-kĕrk-ęn), a

city of Germany, in the province of Westphalia, five miles north of Essen, with which it is connected by electric and steam railroads. It is surrounded by a productive coal-mining region and is noted chiefly as an industrial center. The noteworthy buildings include the townhall, the public library, and a number of fine schools and churches. Among the principal industries are machine shops, iron works, flour mills, and soap factories. The rapid growth of the city dates from 1855, when coal was discovered in the vicinity, and it was incorporated in 1875. Population, 1905, 147,005; in 1910, 169,530.

GEM, a precious stone, especially one intended for an ornament. Gems are sometimes found with a natural polish and crystallized in regular shapes, but more commonly with a rough surface and of irregular form. The term is applied particularly to a stone cut and finished ready for setting and wearing as an ornament, as the ruby, sapphire, diamond, and emerald. Other stones are used for ornament to which the term does not properly apply, such as carnelian and agate. The manufacture of artificial gems has made notable progress in recent times. A kind of glass known as *paste* or *strass,* which contains about fifty per cent. of oxide of lead and is peculiar for its brilliancy and hardness, is a common base for artificial gems. Recently some progress has been made in producing gems artificially. These consist largely of rubies, sapphires, and others of the corundum class. Genuine diamonds have been made by a chemical process, but the expense and labor is too great to make the production profitable. Another product of value is obtained by fusing small chips or imperfect stones in an electric furnace. When the fused product is cut and polished, gems of good size and color are obtained.

GEMINI (jĕm'ĭ-nī), the twins, a constellation of the zodiac, containing the two stars Castor and Pollux. The former star is a double one. The constellation may be seen in the Northern Hemisphere during the evenings of December and January. Gemini is a sign of the zodiac, which is entered by the sun about May 21, and the sun passes from it June 21.

GEMSBOK (gĕmz'bŏk), the name of a large antelope in South Africa, called *kookam* by the natives. It is a stout animal, about four feet high and five feet long, and has straight horns about two feet in length. It has a dark gray color above, white on the under part, and markings of white and black on the head. The gemsbock frequents the mountainous districts and usually congregates in small groups when upon the open plain. It is found in many barren desert tracts, where it appears to subsist a long time without water. Its inability to run with great speed is partly compensated for by its strength, which enables it to withstand the attacks of the lion. The flesh is esteemed highly.

GENDARMES (zhän-därm'), meaning men at arms, the name formerly applied in France to the corps of cavalry that formed a bodyguard to the kings. At present the name refers to a military police composed largely of soldiers taken from the army. About 21,000 men make up the gendarmes at the present time. They include both cavalry and infantry, receive higher pay than other men in the army, and form a national police in the departments and colonies of France. Similar forces are maintained in Russia and Germany, where they serve both as soldiers and national police officers.

GENERALIZATION (jĕn-ĕr-ăl-ĭ-zā'shŭn), in psychology, the act of bringing individuals or particulars under a class, or deducting a general principle from particulars. Some writers use the word *generalize* to mean the forming of logical concepts, while others employ it to signify scientific classification. It may be defined as the power of grasping the common qualities of objects and uniting them into a single notion comprehending them all. From this it will be seen that generalization is the power of combining the individual with the general, of uniting the manifold into one. See **Conception.**

GENESEE (jĕn-ē-sē'), a river of western New York, which has its source in Potter County, Pennsylvania, and, after coursing northward into New York, discharges into Lake Ontario, seven miles north of Rochester. The total length is 140 miles. It passes through a fertile valley, has falls at Portage and Rochester, and is navigable for small craft about fifty miles.

GENESIS (jĕn'ē-sĭs), meaning creation or origin, the name of the first book of the Bible. It is one of the most ancient of existing books, giving an account of the creation, of the original happy state and the fall of man, of the Deluge, and of the dispersion of mankind, ending with the calling of Abraham and the rise and progress of the Jewish nation. Moses is regarded the author of the book of Genesis, but it is supposed that he derived a large part of his materials from written documents coeval with the events recorded, being infallibly guided by inspiration in the entire work. Some writers think that a few additions were made to Genesis after the death of Moses, probably by Ezra. See **Pentateuch.**

GENET (jĕn'ĕt), a carniverous mammal native to Europe and Africa. Only one species is found in the southern part of Europe, whence it extends into Western Asia. Five species are found exclusively in Africa, ranging from the Mediterranean to the Cape of Good Hope. The common genet has a dark gray color, thickly spotted with black, and is nearly allied to the civet. It has retractile claws and a faint smell of musk, and the pupil of the eye is narrow and vertical. The fur is valuable as an article of commerce. It is easily domesticated and is employed in many places to destroy rats and mice.

GENET (zhę-nā'), or **Genest, Edmond Charles Edouard,** diplomat, born in Versailles, France, Jan. 8, 1765; died July 14, 1834. He was trained for a military career and in 1775 became an interpreter for the government. In 1779 he was made an attaché of the French embassy at Berlin and the following year at Vienna, and in 1781 succeeded his father in the department of foreign affairs. He sided with the Girondists during the French Revolution and for some time represented France as ambassador to Holland. In 1792 he was appointed minister to the United States, where he was cordially received, but later denounced the government because it remained neutral in the contest between England and France. His action in enlisting recruits to promote the conquest of Louisiana caused Washington to demand his recall, which was granted in 1794. However, he decided to remain in the United States and was naturalized and took up his residence in the State of New York. In 1794 he married a daughter of Governor Clinton. He translated from the Swedish and Norse writings a work entitled "History of Eric XIV."

GENEVA (ję-nē'vâ), a city of Ontario County, New York, on Seneca Lake, about fifty miles southeast of Rochester. It is on the Seneca and Cayuga Canal and on the Lehigh Valley, the New York Central, and other railroads. Among its municipal facilities are pavements, street railways, electric lights, waterworks, and a library. Besides having a good system of public schools, it contains Hobart College, the State agricultural experiment station, the Delancey Divinity School, and the Delancey School for Girls. Among the manufactures are steam heating apparatus, clothing, scientific instruments, machinery, engines, and boilers. The surrounding country is agricultural and contains many thousand acres cultivated in nurseries. Geneva was incorporated as a city in 1898. Population, 1905, 12,250; in 1910, 12,446.

GENEVA, a city of Switzerland, capital of the canton of the same name. It is situated on the western shore of Lake Geneva, at the point where the Rhone issues, and is connected with European cities by extensive railroad systems.

The city is located on both sides of the lake, though the larger portion is on the south bank of the Rhone, over which several bridges are maintained and facilitate free public intercourse. The two portions of the city are known as the upper and lower, the former containing excellent edifices and beautiful hotels. On the other hand, the lower city is the seat of the commercial institutions and manufactories and the residences of the poorer classes. Among the manufactures are gold, silver, and other metal wares, silk, cotton and woolen goods, leather, calico, hats, musical instruments, clocks and watches, machinery, and chemicals. Of these jewelry, musical instruments, and watches are the most important.

Communication is facilitated by steam navigation on Lake Geneva, the Rhone, and numerous canals, besides by many electric railway lines that center in the city. As a seat of science and literature Geneva takes high rank, its institutions of learning, libraries, museums, and galleries of art ranking with the most famous of Europe. Among the eminent men who resided at Geneva and influenced its learning are Calvin, Knox, Necker, Rousseau, Beza, Sismondi, and Huber. Its cathedrals, public parks, electric lighting system, and statuary take high rank. The university was founded in the 12th century. It carries advanced courses of study and is attended by 1,150 students.

Though originally a Gallic city, it was afterward included in the Roman Provincia, and later passed to the Burgundians and Franks. In the 12th century it witnessed the controversies between the bishops, who were feudatory to the German Empire, and the counts of Savoy, each striving for supremacy. During these contentions the citizens secured numerous advantages, among them religious and political liberties and commercial independence. An alliance was concluded with Freiburg in 1518 and subsequently with Berne, thus making Geneva an important member of the Swiss Confederation. In the Reformation it was a seat and stronghold of Protestantism, becoming so largely under the preaching of William Farel and Calvin. Besides impressing the people with rigid morality, these teachers awakened a taste for the exact sciences. The aristocratic party continued to oppress the people for centuries, although in the 18th century the popular party gained much strength, but the contests that followed might have ended even more dangerously to the people if France and the adjacent cantons had not interfered. France annexed the canton of Geneva in 1798 as the department Du Leman, but, with the overthrow of Napoleon in 1815, it became independent and formed the twenty-second canton of Switzerland. Population, 1910 (city), 58,337; canton, 154,906.

GENEVA ARBITRATION. See **Alabama Claims.**

GENEVA CONVENTION. See **Red Cross Society.**

GENEVA LAKE, or **Lake Leman,** a beautiful fresh-water lake between France and Switzerland, though the larger part of it belongs to the latter country. It is formed as a crescent, has a length of 48 miles from east to west, and is 1,215 feet above sea level. The area is 225 square miles; the greatest breadth, nine miles; and the maximum depth, 980 feet. It is rich in fish, especially trout, pike, salmon, and German carp. The lake is valuable in navigation, being never entirely frozen over in winter. It is entered from the upper end by the Rhone, which pours its turbid and silt-laden water into it, but passes from it clear and transparent. Near the lake are the mountains of Savoy,

while Mont Blanc is visible, though sixty miles distant. The city of Geneva is situated at the point where the Rhone River flows from the lake. Many adjacent localities are celebrated in literature, among them the places treated by Rousseau and Schiller. Byron in "Childe Harold" and "The Prisoner of Chillon" has added interest to the lake.

GENGHIS KHAN (jĕn'gĭs kän), originally known as Temujin, famous Mongol conqueror, born in Deylun Yeldak, near the north bend of the Hoang Ho River, Jan. 25, 1155; died Aug. 24, 1227. He descended from a celebrated Mongol chief, and when thirteen years of age was selected to rule over a number of clans, known as the tribe of Neyrun, which occupied the region between the great wall of China and the Amur River. Being ambitious for conquest, he freed his tribe from paying tribute to the khan of East Tartary, organized a large army, and in 1203 conquered the dominion of Toghrul Ungh. Soon after he extended his dominion from the Pacific Ocean to the Black Sea. His military conduct was so successful and his efforts so well directed that he subdued the Turkish Confederacy, Nayman, the Chinese possession Tangut, and the North Chinese Empire. Several detachments of his vast army carried the campaign as far west as the Crimea, where they established his supremacy, and later returned through the valley of the Volga. His possessions were divided among his children after his death, and traces of his power and influence remained a number of centuries. In religion he was a Mohammedan, though he tolerated other forms of worship, punished crime, exacted taxes for the support of his army, and established a system of postal communication throughout his dominion. Eastern chroniclers maintain that he patronized learning, exhibited marked respect for scholars and architects, and that his civil authority was efficient in protecting the life and property of his subjects.

GENII (jē'nē-ī), in Roman legends, the deities corresponding to the Daemon of the Greeks, and serving to protect all created things and beings from their origin. Each individual person was thought to be accompanied by a Genius from the hour of his birth. In this way he was prompted to good and noble deeds, and the Genius, as a guardian angel, comforted him in sorrow and guided him throughout his earthly career. Cakes, wines, and incense were offered to the Genii as sacrifices on birthdays. The Greeks believed the Daemons to be the spirits of the righteous that had lived in the golden age, and that they watched over mankind and carried prayers and gifts to the gods.

GENNESARET (gẹn-nĕs'ā-rĕt). See **Galilee, Sea of.**

GENOA (jĕn'ō-ā), a seaport city of Italy, capital of the province of Genoa, on the northern shore of the Gulf of Genoa, an inlet from the Mediterranean. It occupies a fine site at the foot and on the slope of the Ligurian Alps. Extensive fortifications surround the city and crown the heights near it. The older portions have narrow streets with lofty buildings, while those of the newer part are spacious and regularly platted and beautified by tall edifices and fine palaces. Orchards and groves of pomegranate and orange trees cover the hills adjacent to the city, and above them rise lofty ranges of towering mountain peaks. The harbor is protected by piers and moles, and is studded with innumerable vessels that carry on an important navigation trade in fruits, cereals, minerals, and manufactured articles produced in the city and surrounding region. Among the manufactures are Italian marble, macaroni, paper, ironware, machinery, cheese, flour, jewelry, gloves, textile fabrics, and scientific instruments.

Many of the buildings are famed in history, among them the Cathedral of San Lorenzo, built in the 10th century; the churches of Santo Stefano and Santa Maria di Carignano; the university, with 1,425 students; and the ducal palace (Palazzo Ducale), built in the 13th century. Other noted buildings include the Theater Carlo Felice, the palaces of Balbi, Doria, Serra, and several others, the town hall, the Plazzo Reale, and the central railway station. The city has a well-organized public school system, schools of fine arts, a military school, the Royal Marine School, a theological seminary, and numerous parochial schools and hospitals. In the public parks are numerous statues, among them several fine marble memorials of Columbus. The Saint George bank building is used as a customhouse and was anciently one of the most stable banks of deposit and circulation in Europe. Its celebrated cemetery, known as Campo Santo, is remarkable for its beauty and the large number of eminent men whose graves it contains. The city is beautified by modern lighting, has electric street railway service, important railroad connections, and is noted for its large commercial and passenger traffic.

Genoa was famous as a seaport under the Romans. It was organized as an independent republic and presided over by doges subsequent to the division made by Charlemagne. Saracen incursions in 935 led the Genoese to form an alliance with Pisa, though in 1119 the two cities engaged in wars and continued hostile until 1294, when Pisa was given a crushing defeat. In the meantime Venice had risen as a successful rival, which led to periodic wars from the 12th to the 14th centuries, and, after discordant strife internally, it became subject to Milan and later to France. Napoleon secured permanent possession of Genoa after the Battle of Marengo, in 1800, and formally annexed it in 1805. In 1815 it became a part of the kingdom of Sardinia, and with it was annexed to Italy. Historically, the Genoese are noted for their spirit of liberality and enterprise. They fostered learning,

encouraged industrial arts, established civil reforms, and built internal improvements. The annexation to Italy within recent times has given the city its present prosperity. Population, 1916, 291,617.

GENSERIC (jĕn'sĕr-ĭk), the most powerful king of the Vandals. He obtained possession of the throne of Spain with his brother Gonderic, and, after the death of the latter, became sole ruler. In 428 A. D. he organized an army of 50,000 men, crossed the Strait of Gibraltar the following year for the purpose of assisting Bonifacius, Roman governor of Africa, and was resisted by the incursions of the Moors. Soon after he conceived the idea of claiming the African possessions of the Romans, and accordingly defeated Bonifacius and founded a kingdom in 439, with Carthage as the capital. Later he conquered Sardinia, Sicily, and Corsica, and laid the conquered regions waste with such destruction that *Vandalism* is still synonymous with barbarism. The Vandals built a large fleet with which they controlled the Mediterranean and captured Rome in 455. They destroyed two Roman expeditions sent against them — the first by Majorian, the western emperor, and the second under Leo, the eastern emperor. Genseric died in 477, reputed the greatest of the Vandal kings, and, according to accounts, was regarded as a scourge of God.

GENTIAN (jĕn'shạn), a genus of plants native to all the continents, but found chiefly in the temperate regions. The *common gentian,* or



ALPINE GENTIAN.

yellow gentian, is native to the mountains of Southern Europe and is found in the meadows of the Alps and Pyrenees. It has opposite leaves, a stem from three to four feet high, and whorls of yellow flowers. The root is employed for medicine to increase the appetite and promote digestion. It is used as a stomachic tonic and is given in the form of a solid, a tincture, an infusion, and as fluid extract. The dried root is a spongy texture with a faint odor, and is intensely bitter to the taste. A species known as the *blue fringed gentian* is found in the southern part of Canada and the northern part of the United States, and other species are more or less widely distributed in North America. The root of the *Alpine gentian* of Europe, which has cup-shaped, blue flowers, is considered the best in medicine, but similar medical properties are contained in other species.

GENTILE (jĕn'tīl), the name applied by the Jews to all who were not of their own nationality. The Jews and Gentiles had an aversion for each other, and the latter were generally regarded in the same spirit as the Christians regard the heathens, though the Jews did not extend to the Gentiles the privileges accorded to pagans by the Christian people. The court of the Gentiles about the temple was the outer space, marked off by a wall or balustrade about four feet high, within which strangers were forbidden to enter, though they might come as far as the barrier to present their offerings. Paul refers to this when he says that "the middle wall of partition" between Jews and Gentiles was broken down by the Gospel.

GENUS (jē'nŭs), in scientific research, a classification of plants or animals which embraces one or more species, closely agreeing in certain characteristics by which they are distinguished from all others. The term applies to forms subordinate to order, tribe, and family. A genus may be constituted of a single species, as the giraffe, which possesses certain characteristics belonging to no other species. In others there are several or many species. To illustrate, the *Mus* constitutes a genus containing such animals as the mouse and the rat, which differ in size and are clearly distinct species, but still have a similarity of structure obvious to all. Among plants the *Rosa* includes the various species of the rose.

GEOFFREY OF MONMOUTH (jĕf'frĭ), historian, born at Monmouth, Wales, about 1100; died about 1154. He was educated as a Benedictine monk near Monmonth, where he became a bishop in 1152. Soon after he was elected bishop of Saint Asaph. He is the author of "Chronicon sive Historia Britonum," which is mainly a translation from an old Welsh manuscript which Walter Calenius, an archdeacon of Oxford, discovered in Brittany, into the Latin. Its historical value is considerable, since it covers an extensive period and is interwoven with many fables and legends. It contains the legends of Arthur and his knights, the romantic fairy pageantry of which can be traced through many centuries of English poetry. Originally this work was divided into eight books and to these Geoffrey added the book of Merlin's "Prophecies."

GEOGRAPHICAL DISTRIBUTION (jē-ŏ-grăf'ĭ-kạl dĭs-trĭ-bū'shŭn), the term applied to

the diffusion of animals and plants in the different regions by natural and artificial means. For centuries the view was held that all species of both the vegetable and animal kingdoms were created within the geographical regions to which the different forms originally were common, but, when the idea came to be held that species are allied and that they originated from a common source, the implication gained widespread foothold that the ancestral stock had a definite birthplace, and from this the various kinds were distributed widely to different provinces and regions. In studying the distribution of plant and animal life it is essential to investigate the means for diffusion and the natural barriers that offer effective obstacles against migration. Animals possessing much power of locomotion, such as fishes, birds, and many land animals, may become easily dispersed to the most remote regions of the continents, and in many cases to adjacent grand divisions.

It is of interest to note that with one exception the mammals of North America are allied to those of the West Indies. From this we may infer that the ancestors of the West Indian animals inhabited the American continent, and that, by some means, they secured passage to those islands. It is likewise interesting to note that the marsupials are confined wholly to America and Australia, that the tapirs are found only in South America and the Malay Islands, that there is a greater difference in the flora of the Pacific coast of North America and Japan than between that of the latter country and the Atlantic coast plain, and that the birds of North America are more closely allied to those of Europe than to the species which are common to South America. Similar notable instances of distribution may be alluded to in relation to various regions of the continents and oceans, each showing a remarkable dispersement in latitude and longitude of the different forms of life, all, of course, being attributable to some natural cause either clearly known or inferred.

The means to facilitate distribution are quite various and their effectiveness depends more or less upon divers circumstances. In the scope of this article it is possible to call attention only to the more important, since the subject is one which may be treated more properly in works especially designed to throw light upon the various phases, such as Wallace's "Geographical Distribution of Animals," Engler's "Distribution of Plants Since the Tertiary Period," and Darwin's "The Origin of Species."

Besides the normal facilities to disperse which are found in the different species, various other means must be taken into account. Seeds of many classes of plants become widely diffused by winds carrying them to regions remote from their native locality, especially those provided with feathery appendages, while animals, insects, and the movements of water by waves, currents, and streams largely transport and disperse them. Oceanic currents likewise carry animals to remote regions, especially in the polar vicinities by ice floes and icebergs. The branches and trunks of trees frequently carry animals and seeds long distances down streams, across straits, and even over extensive bodies of water. Fur-bearing animals often disperse seeds that cling to the fur, and birds of plumage likewise carry them to distant regions. Aquatic birds transport the spawn of amphibian animals and the seeds of plants to remote districts and freshwater bodies of inland waters. In like manner they distribute shellfishes, seeds of marine plants, and various forms of marine life. It is certain that wide distribution has been effected by seeds clinging to the hoofs of animals and to insects driven by strong winds, and often unintentionally by man.

Among the barriers against rapid and wide diffusion are climatic conditions, elevated mountain ranges, and vast expanses of water surface. It is quite certain that a large per cent. of the general distribution, as occurring in recent times, was effected by the sinking of islands and continents, thus detaching a portion of the land masses and with it its proportional share of animal and plant life, such as was likely effected by the detachment caused by the sinking of large areas of the Pacific, thereby forming the great archipelago southeast of Asia and other island groups equally noteworthy. The more recent diffusions, however, were effected by migration, which doubtless occurred in the usual manner by marine life passing over isthmuses, and land forms, including both plants and animals, being carried across straits and narrow channels of water. The most important and widespread distribution of the higher animal and plant life is due to the commercial designs of man. As a source of profit the various domestic animals and highly cultivated cereals, vegetables and other plants have been carried to climates and latitudes agreeable to their production and use.

GEOGRAPHICAL SOCIETIES, the organizations formed to obtain and disseminate geographical knowledge. In 1821 the first important association to promote and extend geographical knowledge was organized in Paris, known as the Society of Geography, which founded the *Bulletin of the Society of Geography* in 1822. The celebrated German society, the Berlin Association of Geography, was founded in 1828, and its proceedings are published annually in *Reports of the Berlin Association of Geography.* The Royal Geographical Society, founded in 1830, is the leading organization of this kind in Great Britain. Among the societies devoted to the study of geography is the American Geographical Society, founded in New York in 1852; the National Geographical Society, organized at Washington, D. C., in 1888; and the Geographical Society of Philadelphia, established in 1891.

GEOGRAPHY (jē-ŏg′rȧ-fy), the science

that treats of the earth. As a study it is pursued under four departments or branches — mathematical, political, physical, and commercial. *Mathematical geography* is that branch of general science which treats of the earth in its relation to the solar system, and forms the true basis for accurate geographical knowledge, since by means of it we are enabled to form clear conceptions of the laws governing terrestrial phenomena. Through its agency we learn of the location of the earth in space; its form, size, and movements; its divisions by lines and circles imagined to be drawn; and the method of representing portions of it on maps.

Political geography embraces the description of the earth in relation to government and societies of mankind. It treats of the manner of life of the people, and of their civilization and government. *Physical geography* is a treatise of the physical condition of the earth, its relation to nature and the natural laws by which it is governed. It treats especially of the atmosphere, the natural divisions of land and water, the aërial currents and movements of oceanic waters, and the distribution of animate and inanimate objects found upon the surface of the earth. These are described not only in a given locality, but the causes of their existence and the natural results are discussed with a view of learning their causes and effects. *Commercial geography* includes an investigation of the products of merchantable commodities, the migrations of plants and animals, the routes of travel and transportation, and the natural laws that govern or facilitate commerce and commercial relations. In the scope of geographical institutions the student is brought in contact with various other branches, such as geology, history, astronomy, and zoölogy, though these are all separate sciences, the relationship serving principally to facilitate general advancement and to broaden culture in basic principles.

In ancient times geographical knowledge was necessarily limited, owing to the insufficient means to navigate the vast expanse of ocean and proceed with any degree of rapidity across the continents. Besides, the absence of powerful offensive weapons of war prevented exploring parties from making material progress against the hostile peoples occupying distant and unexplored regions. The expanse of geographical knowledge is coördinate with that of explorations and discoveries effected by expeditions and vast cruising enterprises. Among the ancient geographers was Eratosthenes, who flourished about 240 B. C. Greater, however, were Strabo, who lived in the reign of Augustus and Tiberius, and Ptolemy, who flourished at Alexandria about 139 A. D. As a people the Phœnicians made the greatest geographical progress in early history. They not only explored the Mediterranean, but passed through the Strait of Gibraltar, cruised along the Atlantic coast of Africa and Europe, and made voyages as far south as the Tropic of Capricorn and north to the British Isles.

Various views were held by early geographical writers in regard to the universe. They regarded the earth a disk with their own country forming the center. The poems of Homer lead to the conclusion that the Greeks in the 9th century B. C. thought the earth to be a circular plane bounded by water and from which the various streams had their source. In the time of Alexander the Great geographical knowledge was extended by his famous expedition to the interior of Asia, and subsequently by cruises on the Indian and Mediterranean waters. Eratosthenes considered the earth a sphere and was the first to use lines to indicate latitude and longitude, and to employ mathematical principles in the construction of maps. Strabo, also mentioned above, wrote extensively regarding geography as understood in his time, and furnished valuable descriptions and drawings of the countries adjacent to the Mediterranean. Ptolemy prepared a geography of a large portion of Eurasia and Africa, including the British Isles, Germany, large ports of Russia, and all the region between the last mentioned country and the Mediterranean. His geography embraced Northern Africa and large regions of Western Asia.

The ancient geographers remained standard authority during the Middle Ages, and new material of note was not added until the extensive voyages of Marco Polo in the 13th century, who published the first accounts of Japan and the East Indies. However, the discovery of America in 1492 by Columbus, the doubling of the Cape of Good Hope in 1497 by Vasca da Gama, and the discovery of Tierra del Fuego in 1520 by Magellan, with contemporary discoveries and explorations, gave geography an enlargement and interest not previously known. Other achievements worthy of note in this connection are the extensive explorations of Vasco da Gama in Eastern Africa and Southern Asia, the expeditions of Frobisher in 1576, of Davis in 1585, of Hudson in 1607, and of Baffin in 1616, all of which led to the enlargement of accurate knowledge. The Dutch navigators Tasman and Van Diemen made fruitful explorations in the Pacific about the middle of the 17th century and added Australia to the explored portion of the earth. Subsequently Captain Cook explored innumerable islands in the Pacific.

The explorations of the 19th century were devoted more largely to discoveries in the polar regions and the interior of Africa. Exploring expeditions were sent to the Antarctic regions from America, England, and France in 1840, when Victoria Land and the Antarctic continent were discovered. Another important discovery was that of the northwest passage around North America by way of Bering Strait and Baffin Bay. It was made in 1850 by an expedition under McClure. Among the most cele-

brated explorers to add knowledge of the interior of North America are Lewis and Clark, Humboldt, Spix, and Frémont, while the interior of Asia and Australia likewise became known largely in the latter part of the last century. The explorations and discoveries of interior Africa by such eminent men as Livingstone, Schweinfurth, Stanley, Bruce, Barth, and Rohlfs have led European nations to occupy practically the entire continent. They not only claimed the regions as colonial possessions, but constructed canals, founded cities, and built vast railroad enterprises. Interior Asia is now in a fair way to become similarly controlled by European peoples. Not satisfied with their successes, the more ambitious are still making venturous exploits to the polar seas, and are promoting extensive excavations to determine complicated questions in physical geography. School textbooks are assuming scientific completeness and institutional instruction is becoming of greater pedagogic worth. The schools of Germany have long led in both these important lines.

GEOLOGICAL SURVEY (jē-ō-lŏg'ĭ-kạl sûr'vā), the name of a bureau maintained by most governments, which has charge of investigations of the mineral resources and geological structure of the country. Bureaus of this kind are under the supervision of a director, who is controlled directly by a cabinet or ministerial officer. In Canada the Geological Survey Department is under the Minister of the Interior and the work is divided into two divisions, known as (*a*) Geological Survey and (*b*) Mines Branch. The direct supervision is under an officer known as assistant director, chemist, and mineralogist, while each of the two divisions is supervised by a director.

The United States Geological Survey was organized as a bureau in 1879, when a plan for unifying the four independent surveys that have been maintained was adopted by Congress. It is under the control of a director, who submits an annual report of plans and operations of the department to the Secretary of the Interior. Among the duties of this department are the making of surveys in regard to the geological formations, the classifications of public lands, the surveys for the irrigation of arid regions, the examination of mineral deposits, the survey and mapping of the areal geology, and detailing information of the rock formations. Maps prepared by the department indicate the character of the surface, the distribution of ores, and the character of the soil. Many pamphlets are published to distribute information in regard to physical and chemical research, mining and mineral resources, and various other subjects of interest coming under consideration of the department.

GEOLOGY (jē-ŏl'ō-jў), the department of natural science that treats of the present constitution and structure of the earth and the operations of its physical forces. It investigates the history of geological formations in past ages, together with the causes and modes of physical changes, and the formation of inorganic and organic structures. The study of geology received attention many centuries ago, but it has taken high rank among the studies only since the beginning of the last century. Herodotus gave the subject much careful thought. He devoted studious consideration to the formation and fertility of the soil in Egypt, and traced their cause to the silt-laden waters of the Nile that overflow the delta and Lower Egypt periodically. Strabo flourished in the 1st century A. D. and ranked as the greatest of early geologists. He took up the discussion of the origin of fossils (q. v.), which long formed the subject of much controversy, and maintained that they were organic when entombed.

Dr. Abraham G. Werner (1750-1817), professor in the school of mines at Freiburg, Germany, in 1775, gave modern geology its widespread interest. He held that a series of universal deposits had been formed by the action of a chaotic fluid, which evaporated and fell on the earth's crust in periodical succession and otherwise operated to erode and deposit silts. He thought this action aided in cooling and thickening the crust, and that it had a marked influence upon the distribution of materials which exuded or were thrown from volcanic craters. In 1788 James Hutton published his "Theory of the Earth," in which he directed attention to the causes that now exist in producing formations. He held a contrary view to Dr. Werner in that he thought granite and basalt are of igneous origin.

At present there are three recognized schools of geology, those known as catastrophism, uniformatarianism, and evolutionism. Those holding to *catastrophism* maintain that there have been a series of creations and catastrophies, life forms springing into existence and after a great lapse of time meeting with universal destruction, as in the deluge of Noah. Of this school Sir Roderick Murchison is a representative. Those holding to the theory of *uniformitarianism* think that causes now in operation alone constitute the reasons of all geologic phenomena. To this theory Sir Charles Lyell holds, and he exemplifies it in his "Principles of Geology." He cites in support of his opinion the action of rivers, tides, currents, and ice as the causes of stratified rock and other formations, directs attention to the action of volcanoes and earthquakes as agencies in producing igneous and metamorphic results, and states his belief that collectively they are sufficiently potent to cause nearly every phenomenon witnessed in studying the earth's crust. Those holding to *evolution* (q. v.) accept all the theories of the uniformitarians, except those referring to the development of life forms. Of this school Darwin and Huxley are representatives, the latter assigning from 1,000,000 to 300,000,000 years as

the time required for the production of the present conditions in geological phenomena.

It is probable that both the surface and interior of the earth were once highly heated, a condition probably still existing within the earth, and after cooling gradually formed a thin layer or crust at the surface. The lowest rocks, being of igneous or heat formation, are called igneous rocks, of which granite is an example. Owing to the presence of intense heat while forming, life could not exist, hence fossils do not abound. At that time the waters which now cover a large portion of the earth hung over the surface as dense vapor, but, as soon as a thin crust had formed, the cooling atmosphere tended to bring the vapor to the dew point and it fell to the surface in the form of rain. By continued cooling the crust became thicker, while contractions wrinkled the surface and caused portions to form dry land by emerging from the ocean. By the action of the water and that of heat and cold vast quantities of materials were broken up and ground into sand, clay, gravel, and other forms, which were carried to particular locations and stratified into strata of slate, sandstone, shale rock, and other common forms. These rock formations are known as aqueous or sedimentary, and contain more or less fossil remains. The heated interior long remained the seat of volcanic disturbances, which formed channels through the crust, and still give evidence of internal action and general contraction by occasional, though diminished, eruptions. The rocks modified by the action of heat are known as metamorphic.

Geologists make subdivisions of time based on the main rock systems, in each of which peculiar characteristics and organic remains, if present, have been studied and classified. These are shown in an ascending order in the following table:

LIFE PERIODS.	ROCK SYSTEMS.
Post-Tertiary or Quaternary	Recent—Alluvial, Peat, etc. Pleistocene.
Tertiary or Cenozoic	Pliocene. Miocene. Oligocene. Eocene.
Secondary or Mesozoic	Cretaceous. Jurassic (Oölitic. Liassic.) Triassic.
Primary or Palaeozoic	Permian or Dyas. Carboniferous. Devonian and Old Red Sandstone. Silurian. Cambrian.
Archaean, Laurentian, or Eozoic	Fundamental Gneiss.

The five principal periods or times are divided into ages in which the forms of life are classified in an ascending scale as follows:

Quaternary	The Age of Man.
Cenozoic	The Age of Mammals.
Mesozoic	The Age of Reptiles.
Palaeozoic	The Age of Coal Plants. The Age of Fishes. The Age of Invertebrates.
Archaean	The Lifeless Age and Dawn of Life.

The Archaean time witnessed the dawn of life. It included an extensive era, and the temperature was so extremely high that life could not have existed. However, the simpler forms began to be created toward its close. The rocks of this period resulted from cooling of the molten mass of the earth and became the covering of the entire surface, including the regions below the ocean. On the older archaean rocks sedimentary rocks less ancient were deposited. At this period North America was largely submerged. Only portions in the vicinity of Lake Superior, the Iron Mountains of Missouri, the Blue Ridge range, the Wind River Mountains, the ranges farthest east in Colorado, and the New Jersey Highlands projected above the highly heated water. These portions constitute the oldest part of North America. It was within this time that iron was formed, the rocks of this period containing a large per cent. of iron ore. The Laurentian and Huronian are among the North American rocks that then existed, the former in the vicinity of the Saint Lawrence and the latter near Lake Huron, from which they were named.

In the Palaeozoic time the animals and plants but slightly resembled those now living. Fossil remains are mostly those of mollusks, protozoa, radiates, and articulates. The rocks were made under water and consist of vast deposits of limestone, sandstone, and shales, which are either largely or entirely formed of the remains of shellfish, clams, oysters, and other similar forms of life. This is known as the Silurian or Age of Invertebrates. The Devonian Age followed, in which the first vertebrates appeared in the form of fishes. Plants became abundant and vast swarms of insects appeared. In the Carboniferous Age the surface was covered with many fernlike and other plants which were of gigantic size and ultimately formed beds of coal (q. v.) by the remains decaying under water. The period was characterized by alternated elevations and subsidences, thus forming in some regions two or more coal veins by being tilted, as in many regions of the Allegheny Mountains. In this period all the animals of the subkingdoms lived and reptiles began to appear.

In the Mesozoic time, known also as the Age of Reptiles, the plants and animals began to resemble existing species. The reptiles were greatly in preponderance and included many species of snakes, turtles, and crocodiles. The ichthyosaurus, an animal that swam in the sea or paddled in the mud, and the plesiosaurus, a large reptile with a snakelike neck, were common in this period. Great birds, such as the archaeopteryx (q. v.), lived at this time and left their foot imprints as fossil remains by walking over the forming rocks.

In the Cenozoic time North America was largely above the sea, though numerous large lakes with fresh water were abundant, the

largest of which extended from Texas northeasterly to Nebraska. This period bears evidence that vegetation was still abundant in the Arctic zone, where fine forests of redwood, magnolia, and other species native to warm climates extended over vast regions. Large animals, including elephants, were abundant in the Rocky Mountains, of which fossil remains are not uncommon. The glacial period swept over the northeastern portion of the continent of North America at that time with its destructive effects upon life forms, causing vast drifts and carrying great boulders, reaching south to about the 40th parallel. The glacial period was followed by the Champlain period, in which alternating floods and varying climates followed in succession. Subsequently the climate was again tropical, when many animals inhabited the forests, while slowly through long periods of time the temperature gradually fell. In the Quaternary Age the present animals and plants appeared and man was created. Geologists differ as to the length of the creation period measured in years, and many do not undertake to assign any given number of years. They commonly call all time before life appeared Azoic and the appearance of life Eozoic, and classify all subsequent time as exemplified above.

GEOMETRY (jē-ŏm'ē-trў), the science that relates to the measurement of definite portions of space, such as lines, angles, surfaces, and volumes. The various divisions of geometry include plane and solid geometry, analytical geometry, descriptive geometry, and higher geometry. *Plane geometry* and *solid geometry* treat of right lines and plane surfaces, and of circles and spheres. In *higher geometry* are treated the conic sections, curved lines, and bodies generated from them. In *analytical geometry* are involved the various calculi in algebraical forms, while *descriptive geometry* embraces an extension of the principle of projections.

The origin of geometry is traced to the Hindus, but the Egyptians appear to have possessed a knowledge of it at the times the pyramids were built. Thales, who flourished in 639-548 B. C., is among the first of the Grecian geometrists, and to him is attributed the discovery of the properties of triangles. Pythagoras was a disciple of Thales. He greatly extended the knowledge of the geometry of polygons by discovering the theorem of the square of the hypotenuse. He demonstrated that the area of a circle is greater than that of any plane figure having an equal perimeter, and that the sphere has the greatest volume of the bodies which are bounded by an equal surface. Many other Greeks followed in adding to the science, among them Anaxagoras, Hippocrates, Plato, and Euclid. The last mentioned founded a school of mathematics in Alexandria, Egypt, some time in the reign of Ptolemy I., in 323-284 B. C. He published a treatise on "Porisms," a book on "Data," and his "Elements of Geometry." Most of his works are lost, but his "Elements" are still in use in many schools and colleges. Among the celebrated geometricians of recent times are Kepler, Descartes, Pascal, Newton, and Carnot.

GEORGE I., Christian William, King of Greece, second son of Christian IX., King of Denmark, born in Copenhagen, Dec. 24, 1845. He was liberally educated and subsequently served with distinction in the Danish army. After the abdication of Otho I., King of Greece, in 1863, he was elected king by the Greek national assembly, and accepted the crown with the consent of the treaty powers. In 1867 he married Princess Olga, daughter of Grand Duke Constantine, at Saint Petersburg. His administration has been popular, though his reign was disturbed by diplomatic and military difficulties in the Balkan peninsula. In the war with Turkey, in 1897, he took an active interest for the betterment of conditions in Crete, but lost some territorial advantages. However, he added to his popularity by favoring a freer constitutional government among his people. He was slain by an insane man Mar. 18, 1913, and was succeeded by his son Constantine I., Duke of Sparta. The latter was born Aug. 2, 1868, and distinguished himself in two Turkish wars.



GEORGE I. OF GREECE.

GEORGE I., son of Ernest Augustus, King of Great Britain and elector of Hanover, born in Hanover, Germany, May 28, 1660; died June 10, 1727. In 1682 he married Josephine Dorothea of Zell, succeeded his father as elector of Hanover in 1698, and commanded the imperial army in 1717 during the War of the Spanish Succession. His claim to the throne of England was based upon the rights of his mother, who was declared the heiress to the crown by the Act of Settlement in 1701. Immediately after the death of Queen Anne, in 1714, he ascended the throne with the active support of Marlborough and the Whigs. His reign was marked by force of character, but Sir Robert Walpole was the chief influence in the government. The notable events include several risings of the Stuarts, the triple and quadruple alliances against Spain, and the organization and failure of the South Sea Company in 1720. He was the first representative of the Hanover dynasty in England.

GEORGE II., son of George I., King of Great Britain, born Oct. 30, 1683; died Oct. 25, 1760. In 1705 he married Wilhelmina Caroline of Brandenburg-Anspach, who was a woman of

good character and a strong personality, and in 1727 he succeeded his father. His interest in the government was more strongly exemplified than that manifested in his father's reign, though his policy was largely shaped by Walpole and Pitt. The reign was characterized by the rise of numerous eminent men of letters in art and diplomacy, and by the War of the Austrian Succession, in which George II. took a personal interest. In this period Canada was conquered for England, the British Empire extended its influence in India, and the colonial policy of Great Britain was greatly augmented.

GEORGE III., King of Great Britain, eldest son of Frederick, Prince of Wales, born in London, June 4, 1738; died at Windsor Castle, Jan. 29, 1820. He succeeded his grandfather, George II., married Princess Charlotte Sophia of Mecklenburg-Strelitz, and was by her the father of fifteen children. His general education was limited and he spoke and wrote English poorly, but was well versed in the use of French and German. He had no interest in literature, but insisted upon royal dignities and was highly moral. His long reign of sixty years was noted for many historical events, among them being the Wilkes controversy, the American Revolution in 1775-83, the French Revolution in 1789, and the Irish Rebellion of 1798. It witnessed the rise of many noted statesmen, among them Burke, Pitt, Chatham, and Fox, and such navigators as Nelson and Wellington. The mind of George III. failed in 1810, after which he became insane.

GEORGE IV., King of England, son of George III., born Aug. 12, 1762; died Jan. 26, 1830. He was a man of fine intellectual ability and address, and possessed many personal attractions, but his reign was characterized by his failure in moral respects. In 1811 he became regent because of his father's insanity and in 1820 succeeded to the throne. Among the events of his reign is the Catholic Emancipation Act passed in 1829 by the Wellington ministry. As he died without descendants, his only daughter having died childless in 1817, he was succeeded by his brother, Duke of Clarence, with the title of William IV.

GEORGE V., son of Edward VII., King of England, born June 3, 1865. He became heir-apparent on the death of his elder brother, in 1892, and made a tour of the world in 1901. In 1893 he married Princess Mary of Teck, and in 1910 succeeded his father. The Great European War presented the leading issues of his reign. See Prince of Wales.

GEORGE, Fort, a small fortress of Canada, near Queenstown, Ontario, on the Niagara River. General Brock took up his headquarters at Fort George in 1812, where he was defeated on May 27, 1813, by a force of Americans.

GEORGE, Henry, political economist, born in Philadelphia, Pa., Sept. 2, 1839; died Oct. 29, 1897. He was apprenticed when a boy to learn the art of a seaman, but after reaching California he engaged in journalism, and became one of the founders of the *Post* of San Francisco. In 1876 he was appointed State inspector of gas meters, three years later was made trustee of the San Francisco free library, and about the same time published "Progress and Poverty," a work on economics that won wide popularity. In 1880 he settled in New York, visiting Europe the following year to study the land question, and made several subsequent visits to the British Isles and continental Europe. He promulgated his theories by lecturing extensively and by organizing single-tax clubs in many sections of the country. Among his best known publications are "The Land Question," "Social Problems," "Protection or Free Trade," and "The Irish Land Question."



HENRY GEORGE.

GEORGE, David Lloyd, statesman, born in Manchester, England, in 1863. His father, William George, a Welsh schoolmaster, died in 1865, and the son was reared in Wales by an uncle. He studied law, was elected to parliament in 1890, and entered the cabinet of Campbell-Bannerman in 1906. On the death of Kitchner, in 1916, he became head of the war council, and before the end of the year succeeded Asquith as premier. His public life witnessed the advance of many important reforms.

GEORGE, Lake, a beautiful lake in northeastern New York, extending from southwest to northeast. The length is thirty-five miles, breadth, from one to three miles; and greatest depth, 400 feet. The surface has an elevation of 310 feet above sea level. On its northern shore are the ruins of Fort Ticonderoga. The shores are beautified by lofty hills, on which picturesque forests abound. The outlet is into Lake Champlain, which is a short distance toward the north. Lake George is a popular resort for many artists and tourists.

GEORGE, Saint, the patron saint of England, who is venerated by both the Greek and Roman churches. His history is legendary, but it is thought that he was born at Cappadocia of noble Christian parents. He secured distinction as a soldier, professed his faith before Emperor Diocletian, and on April 23, 303, suffered martyrdom at Nicomedia. He was first honored as a Christian martyr in Phoenicia, but later also in Palestine and the whole of Western Asia. Many churches were built to his honor, the Hellespont was named Saint George's Arm, and his fame spread rapidly to the west. In France

he was honored by the military profession in the 6th century, but the most widespread information of him came about after the Crusades, by which knowledge of various incidents connected with his life spread to all parts of Europe. In 1350 he was made the patron of the Order of the Garter by Edward III., and in the 15th century Frederick of Austria established an order of knighthood in his name. Several countries adopted banners to designate allegiance to the members of Saint George. They consisted of white with a red cross, and in some countries minute badges were worn on the arm of soldiers. Russia regards him as the patron saint of the imperial domain.

GEORGE FREDERICH ERNEST ALBERT. See **Prince of Wales.**

GEORGE JUNIOR REPUBLIC, the name of a community maintained for boys and girls near Freeville, N. Y., about eight miles west of Ithaca. It was established by William R. George in 1895. The purpose is to afford employment and training for unfortunate children, most of whom are obtained from the cities. This community has a constitution modeled after that of the United States, which provides for the election of legislative, judicial, and executive departments. Mr. George was the first president, but this and all other offices have been filled by boys since 1896, though the power to veto is retained by Mr. George. It is incumbent upon the members of the community to work at some occupation, such as carpentry, printing, blacksmithing, farming, or domestic science. The buildings include a store, a library, a bank, and a school, and several hotels, restaurants, and workshops. Primary and grammar schools are provided for all children under sixteen years of age and the courses fit the students for academic or college work. The trustees of the enterprise control about 400 acres. At present the average attendance is about 225 children.

GEORGETOWN (jôrj'town), the capital of British Guiana, situated near the mouth of the Demerara River, in Demerara County. It is the most important city of the Guianas. The streets are regularly platted, with fine shade trees and buildings, and the city is connected with adjoining trade centers by railways. Among the public buildings are the town hall, the Parliament building, the Episcopal cathedral, Queen's College, a mariners' hospital, a public library, and a museum. Besides its public school system, there are a number of flourishing historical and scientific societies, and divers religious and economic associations. The streets articulate with several canals which furnish convenient connection with the harbor. Most of the buildings are placed on piers to elevate them above the low site. The principal exports include coffee, sugar, fruits, and rum. Among the imports are machinery, fabrics, and manufactured articles. The city is the center of the export and import trade of the colony, has a good harbor, and is well fortified. Three-fourths of the inhabitants are Negroes and people of native birth. Population, 1916, 54,692.

GEORGETOWN, a city of South Carolina, county seat of Georgetown County, 55 miles northeast of Charleston, on the Georgetown and Western Railroad. It is located at the head of Winyah Bay and is important as a seaport. The trade consists chiefly in rice, fish, turpentine, cotton, and machinery. It has electric lights, waterworks, and a number of fine school and county buildings. The first settlement was made on its site about 1700 and its incorporation dates from 1805. Population, 1910, 5,530.

GEORGETOWN UNIVERSITY, an educational institution in Georgetown, D. C., which is now included within the limits of Washington. The university was founded in 1799 and later, in 1815, it was empowered by Congress to grant academic degrees. It is under the auspices of the Society of Jesus, an order of the Roman Catholic church, and carries courses in dentistry, medicine, law, philosophy, and theology. Degrees are conferred in arts, dentistry, law, medicine, and philosophy. About 950 students attend the different departments. The library contains 90,000 volumes.

GEORGE WASHINGTON UNIVERSITY, an institution of higher learning located at Washington, D. C., the origin of which dates back about ninety years. It was originally the Columbian College of the District of Columbia and was chartered by a special act of Congress on Feb. 9, 1821, with all the powers commonly granted to American colleges. By a special act of March 3, 1873, Congress changed the name to the Columbian University. By another special act of Congress on Jan. 23, 1904, the Columbian University was authorized, on compliance with certain formalities, to take a new name, the name chosen to be approved by the Secretary of the Interior and the Commissioner of Education. These formalities were complied with, and on Sept. 1, 1904, the present name was adopted. On March 3, 1905, Congress recognized the George Washington University by this name and conferred upon it additional powers of the most comprehensive nature for carrying on higher education. It may, under its charter, apply in whole or in part the English system of carrying on undergraduate work through colleges which are educationally under its jurisdiction. Such colleges are organized by permission of the university under a special incorporating act contained in the university charter. Each college has its own trustees, faculty, and financial foundation, separate and distinct from the university. All are, however, so under the jurisdiction of the university that they must conform to the standards set by it and can only present to it their candidate for degrees, all degrees being conferred by the university. It carries on graduate work directly through its special university lectures. All the

existing university systems may thus be applied by it in carrying on its work; and by this composite plan of organization, combining the advantages of a federal and a unitary system, the work of the university is standardized and coördinated, the time of the student is economized, and the institution is kept at the highest point of efficiency.

In addition to its power to permit the incorporation of colleges in the District of Columbia which are educationally under its jurisdiction, the university is authorized to affiliate with itself institutions of learning outside the District, which may desire to have the benefit of university affiliation at Washington. This feature enables colleges to enter into arrangements whereby their students may do some of their work in the national capital and receive credit for it towards the degree given by the college, while these students may, at the same time, be pursuing graduate or professional studies and taking their graduate or professional degree at the university.

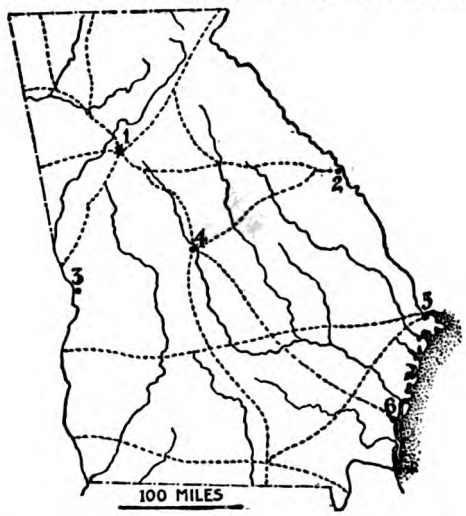
A provision of the charter reads as follows: "Persons of every religious denomination shall be capable of being elected trustees; nor shall any person, either as president, professor, tutor, or pupil, be refused admittance into the university or be denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion." The board of trustees is organized so that no religious denomination has a control. The charter provides for a board of visitors, which may be representative of the interests of the country at large, and which will assure the observance of every provision of the charter.

The university has, in its various faculties, over two hundred professors and teachers. It has fourteen hundred students, every State in the Union being represented, as well as foreign countries. It gives full day instruction in all its colleges and departments. Undergraduate work in arts and sciences is done by Columbian College, which is a corporation recently organized under the provisions of the charter, a College of Engineering, and a College of Pharmacy. The possibility of giving undergraduate instruction through colleges under the jurisdiction of the university, on the broadest as well as on the most specific and practical lines, is thus illustrated. The graduate work of the university is done through a graduate department of the arts and sciences. It has a department of medicine, a department of law, a college of the political sciences, and a teachers' college.

The college of the political sciences carries on undergraduate, graduate, and professional instruction in American history, politics, economics, finance, international law, and diplomacy. It has distinguished teachers and lecturers and has graduated many young men who now hold important positions in the civil and foreign service of the United States.

GEORGIA (jôr'jĭ-à), a State of the United States, one of the original thirteen, popularly called the Empire State of the South. It is bounded on the north by Tennessee and North Carolina, east by South Carolina and the Atlantic, south by Florida, and west by Alabama. Its length from north to south is 330 miles; width, 253 miles; and area, 59,475 square miles, including 495 square miles of water surface.

DESCRIPTION. The State lies partly in the coastal plan and partly in the Appalachian highlands. In the eastern part are the Blue Ridge Mountains, which cross into the State from North Carolina and terminate in the northern part of Georgia. These mountains have a general elevation of from 3,000 to 5,000 feet, culminating in Sitting Bull Mountain, which has an elevation of 5,046 feet above sea level. In the western part is the Cohutta group, which is a continuation of the Unaka Mountains of Tennessee, and the Lookout and Sand Mountain ranges are in the northwestern corner. A broad plain characterizes the coastal region, where the surface is slightly elevated above the sea, but it rises quite uniformly toward the interior. Between the coastal plain and the mountains is a broad area known as the Piedmont plateau, which extends over about one-third of the State. Numerous swamps prevail in the low region of the coast, but the largest marshy tract is the Okefinokee Swamp, which is 30 miles wide and 45 miles long, and a small part of it extends into Florida. Off the coast are numerous islands, including Ossahaw, Saint Catherine's, Sapelo, Saint Simon's, and Cumberland.



GEORGIA.

1, Atlanta; 2, Augusta; 3, Columbus; 4, Macon; 5, Savannah; 6, Brunswick. Chief railways are shown by dotted lines.

The rivers form a valuable network of drainage and furnish considerable transportation facilities. Much of the northeastern boundary is formed by the Savannah River, which is

navigable to Augusta. A large part of central Georgia is drained by the Altamaha, which receives the inflow from the Oconee and Ocmulgee, and is navigable to Macon. Other rivers that flow into the Atlantic include the Ogeechee, the Satilla, and the Saint Mary's, the last mentioned forming a part of the northern boundary of Florida. The Coosa and several of its tributaries, which belong to the Alabama River basin, drain the northwestern part of the State. A number of rivers flow southward into the Gulf of Mexico, including the Appalachicola, which is formed at the southwestern corner of the State by the junction of the Flint and the Chattahoochee, the latter forming a large part of the western boundary. No lakes of importance are located within the State, but a number of lagoons and sounds characterize the coast.

The State has a wide range of climate. On the coast in the southern part the annual average temperature is 70°, while in the valleys of the mountain regions it falls somewhat below 40°. In the northern part the climate is quite equable, no season of the year being severe or marked with extremes. Snow and frosts are very rare in the southern part, where the summers are long and the climate is similar to that of Florida. Brunswick has a mean temperature of 69°; Athens, 63°; and Atlanta, 61°. The State has an average rainfall of 48 inches, being greatest in the northern and smallest in the southern part. Fevers and malaria are not infrequent in the marshy region, but all other parts are healthful the entire year. Far toward the interior extend beautiful forests of palmetto, oak, beech, magnolia, elm, and other useful species of timber. The wild animals include alligators, wildcats, bear, opossum, and many species of birds and waterfowl.

MINING. Many minerals are found in the mountainous region of the northwestern part. Both coal and iron are obtained in considerable quantities, hence supply a considerable share of the material used in manufacturing. Gold has ben produced in paying quantities for about a century, and the State yields nearly one-half of the manganese produced in the United States. Georgia marble is a peculiarly valuable product, both for monuments and the construction of bridges and buildings. It is especially valuable for finishing stone. Other materials include silver, bauxite, limestone, granite, amethyst, and beryl.

MANUFACTURING. Within recent years the manufacturing interests have been greatly enlarged and diversified, and the State takes a high rank in this respect among the southern states. The forests yield vast quantities of turpentine and tar, and a large part of the lumber products is utilized in making furniture and machinery. However, in the value of the output, the first place is held by textiles. In the manufacture of cotton products Georgia is surpassed by only three of the New England states. These products include textiles, hosiery and knit goods, cottolene, and cotton-seed oil and cake. The manufacture of fertilizers has made rapid progress, which is true likewise of railway cars, machinery, flour, clothing, and rosin.

AGRICULTURE. About seven-tenths of the surface is in farms, hence agriculture is the leading industry. A larger acreage of land is improved at present than at any former period, and the farms average a smaller size. This is accounted for by the fact that many of the large plantations have been subdivided and are worked by Negro farmers, though fully 65 per cent. of the land is worked by the whites. Cotton and corn are the chief crops, and the value of the product of these is about equal, though formerly cotton held a much larger place than corn. Sea-island cotton of a fine quality is grown extensively along the coast and on the islands, and the upland species thrive in all parts of the State. In 1910 the State had 3,343,083 acres in cotton and 3,477,684 acres in corn. Oats and wheat, which are grown on about an equal area, have an acreage of less than one-tenth of either corn or cotton. Other farm products include rice, hay, potatoes, peanuts, and sugar cane. Cattle are grown both for meat and dairy purposes, each of which receives marked attention. Other domestic animals are mules, swine, horses, sheep, and poultry. Fruits of all kinds can be grown profitably. The State has very large interests in the culture of oranges, lemons, pineapples, peaches, pears, apples, and garden vegetables.

TRANSPORTATION. The State has a coast line of 128 miles and a large mileage of navigable streams. In 1917 the railroad lines aggregated 7,125 miles, exclusive of the many interurban lines of electric railways. All of the counties have railway or river transportation facilities, hence every section can be reached conveniently. Atlanta, Savannah, Albany, Macon, Columbus, Rome, Athens, and Waycross are among the principal railway centers. Savannah is the chief export city, being located near the mouth of the Savannah and on a number of railways. Brunswick and Saint Mary's have a considerable foreign commerce. The chief exports include cereals, cotton, turpentine, granite and marble, machinery, manganese, and textiles. The fisheries, especially shad and oysters, furnish considerable material for exportation.

EDUCATION. Educationally, Georgia has attained to an enviable position among the states of the South. Common schools are maintained throughout the State and are instrumental in causing illiteracy to decrease rapidly. Funds are supplied liberally to maintain high schools in the larger centers of population, while normal schools and other institutions of higher learning are rapidly multiplying and increasing in effective value. The number of higher insti-

tutions maintained for white pupils include several universities, and about forty colleges and private institutes, while the needs of the Negro youth are met by six higher institutions. The State University of Georgia, which is at the head of the system of education, is situated at Athens. Other institutions which are maintained under State support include the North Georgia Agricultural College at Dahlonega, a normal and industrial school for girls at Milledgeville, a technological school at Atlanta, and an industrial college for Negroes near Savannah. Besides these are numerous denominational and nonsectarian institutions of higher learning, among them Mercer University at Macon, Emory College at Oxford, the Wesleyan Female College at Macon, and the Lucy Cobb Institute at Athens.

GOVERNMENT. Georgia is governed by a constitution which was ratified by the people in 1877. It confers the right of suffrage to all male citizens 21 years of age, with the requirement that they shall have been citizens of the State one year and of the county six months, and that they have registered and paid assessed taxes. The Governor is elected for a term of two years and is ineligible for four years after having served two terms. He has the power to veto bills passed by the Legislature, but his veto may be overcome by a two-thirds vote of each house. Representation in the Legislature depends upon a population basis, and bills appropriating money must originate in the house of representatives. The legislative branch consists of two houses, the senate and house of representatives, and the members of each are elected for a term of two years. A chief justice and five associate judges make up the supreme court, in which the terms of service are six years. Each judicial district has a superior court judge, who is appointed for four years by the General Assembly. The justices of the peace, who are elected for four years, have local jurisdiction in the militia districts.

INHABITANTS. The State has eleventh rank in the number of inhabitants and next to Texas is the most populous southern State. In some counties the Negroes greatly outnumber the whites, especially in the southern part of the State, and the whites are most numerous in the mountainous regions. Atlanta, the capital, is the largest city. Savannah, on the Atlantic coast, is the chief seaport. Other cities of importance include Augusta, Macon, Athens, Rome, Brunswick, Thomasville, and Columbus. In 1900 the State had a population of 2,216,331. This number included 1,035,122 colored persons, or 46.7 per cent. The total negro population was 1,034,199. Population, 1910, 2,609,121.

HISTORY. The history of Georgia begins in 1540, when De Soto visited that region with 600 Spaniards in search of gold. However, not until 1733 were permanent settlements made. At that time James Oglethorpe founded a colony for the refuge of poor debtors and the persecuted Protestants of Germany, and named the colony in honor of George II. The settlement founded developed into the city of Savannah, but in 1752 the charter granted Oglethorpe was surrendered to the British and Georgia became an English province. During the Revolution the people of Georgia entered into the struggle for liberty with much enthusiasm, but many were compelled to leave their homes by the invading armies of England. The first constitution was framed in 1777, and on Jan. 2, 1788, the Constitution of the United States was ratified. In 1838 the Creek and Cherokee Indians were removed to Indian Territory, now Oklahoma, after prolonged troubles and local wars.

In the Civil War Georgia sided with the South, seceding in 1861, and furnishing an effective force for the Southern army. Its own capital, Atlanta, was for a brief time the capital of the Southern Confederacy. Sherman marched through the heart of the State when on his famous expedition to the sea. The recent history is one of large agricultural, manufacturing and mining development. Several industrial exhibitions have attracted attention to the superior resources of the State, such as the National Exposition held at Atlanta in 1881. The State enacted a law in 1907 which forbade the sale of liquor after Jan. 1, 1908.

GEORGIA, formerly a kingdom of Europe, but now a part of the Russian Empire. It comprises the territory lying south of the Caucasian Mountains, between the Caspian and the Black seas, and is bounded on the south by Persia and Asiatic Turkey. The region is divided into the Russian governments of Kutais, Baku, and Tiflis. Anciently it comprised the kingdoms of Albania, Colchis, and Iberia. The Georgians trace their history back to Japhet, but little is known of them until the time of Alexander the Great, who conquered their country, and after his death they established a government of their own. In the 4th century they became Christianized, but many of them are now Mohammedans. Georgia prospered until the 13th century, when it was conquered by the Mongols, and Timur laid it waste in the 14th century, but it was liberated in the 15th century by George VII. He was succeeded by Alexander I., who divided the territory among his three sons. It was invaded a number of times by the Persians and Russians until 1802, when Paul, Emperor of Russia, proclaimed it a part of his royal dominion. The Georgians speak a language that is regarded a link between the tongues of Eastern Asia and those of the Indo-European peoples.

GEORGIA, Strait of, a large inlet from the Pacific Ocean, in the northwestern part of North America, which separates Vancouver Island from the mainland. It is about 250 miles long, in a direction from southeast to northwest, and has an average width of 25 miles.

The Fraser River discharges into it. It is connected with the Pacific Ocean at its northern end by Queen Charlotte Sound and at its southern end by the Strait of Juan de Fuca.

GEORGIA, University of, a State institution of higher learning at Athens, Ga., chartered in 1785. It was formally opened in 1801 and is the oldest State institution of the United States. In 1872 it received the proceeds arising from the sale of lands granted to Georgia under an act of Congress passed in 1862, and since that time it has greatly increased its facilities. The institution comprises the State College of Agriculture; Franklin College; North Georgia Agricultural College, situated at Dahlonega; the law school; the medical college, situated at Augusta; the Normal and Industrial School for Girls, situated at Milledgeville; the School of Technology, situated at Atlanta; the State normal school, and the industrial college for colored persons. It has a library of 45,000 volumes, a faculty of 165 members, and an attendance of 1,250 students.

GEORGIAN BAY, an inlet from Lake Huron into Canada, extending into the south part of the Province of Ontario. It is about 120 miles long and 50 miles wide. The deepest water, which is in the southwestern part, is about 300 feet. Manitoulin Island and the peninsula of Cabot's Head partly separate it from Lake Huron, with which it is connected by North Channel and a short channel south of Manitoulin Island.

GERA (gā'rà), a city of Germany, capital of the principality of Reuss, on the White Elster, 44 miles southeast of Weimar. It is regularly platted and well built. The chief buildings include the post office, the palace of the prince, the theater, and a number of schools. It has manufactures of woolens, carpets, jewelry, cigars, brick, leather, and machinery. The streets are well paved with stone and macadam. It has extensive systems of waterworks, sewerage, and electric urban and interurban railways. Gera dates from the 12th century and became a possession of the house of Reuss in the 14th century. Population, 1905, 46,909; in 1910, 49,965.

GERANIUM (jĕ-rā'nĭ-ŭm), the name of a flowering plant, popularly called *crane's bill,* which constitutes the typical genus of the order *Geraniaceae.* A number of species are cultivated for their flowers, of which the *spotted crane's bill* is the largest. It has a stem about two feet high and bears light purple flowers. Most species have a bitter rootstock, which is used in medicine, when it is known as *alum root.* They thrive best in rocky places, on sandy shores, and on the slopes of mountains. By cultivation a large number of plants with beautiful flowering qualities have been originated. The geraniums commonly cultivated are grown as flowering plants and are known in botany as *Pelargoniums.* They are native to the southern part of Africa, especially to Cape Colony. These have been widely acclimated and are popular for window culture and greenhouse decoration. They are easily propagated by cuttings, and bloom almost continuously under proper care.



GERANIUM.

GÉRARD (zhā-rär'), **Baron François Pascal,** noted painter, born in Rome, Italy, March 11, 1770; died Jan. 11, 1837. His most noted work is a historical painting of the "Battle of Austerlitz." Louis XVIII. made him court painter and promoted him to the rank of baron.

GERARD, James Watson, diplomat, born at Geneseo, New York, in 1867. He graduated at Columbia University in 1900 and from the Columbia Law School in 1902, and shortly after became associate justice of the supreme court of New York. President Wilson made him ambassador to Germany in 1913, where he served until 1917, when he was recalled on account of the war.

GERHARDT (zhā-rär'), **Carl Friederich,** famous chemist, born in Strassburg, Germany, Aug. 21, 1816; died Aug. 10, 1856. After securing a liberal education at Carlsruhe and other schools, he settled in Leipzig. He developed the doctrine of homologous series, originated the theory of types, and devised an improved system of notation in chemistry. His chief work is entitled "Traité de chimie organique."

GERHARDT (gĕr'härt), **Paul,** famous poet and theologian, born in Saxony, Germany, March 12, 1607; died June 7, 1676. In 1668 he was appointed archdeacon of Lübben in the duchy of Saxe-Merseburg. He ranks as an eminent Lutheran divine and is the author of many songs still popular in Protestant churches. His productions include 123 excellent hymns, many of which have been translated into various languages. The most celebrated and widely

translated include "Now All the Woods are Sleeping," "Jesus, Thy Boundless Love for Me," and "O Sacred Head Once Wounded." His collected songs were published in 1666 under the title "Spiritual Songs."

GERMAIN (jĕr-măn'), **Henri,** financier, born in Lyons, France, in 1824; died Feb. 2, 1905. He was educated in his native city and at an early age entered public life. In 1869 he was elected to the legislature for the department of Ain, was afterward prominent in the chamber of deputies, and in 1885 was elected a member of the Academy of Moral and Political Sciences. His reputation is based chiefly on the great banking institution which he founded, known as the Crédit Lyonnais. This organization has branches in all parts of the world and is based upon the business principle that deposits are to be securely invested and that they may be utilized at any time when it is necessary to realize on them.

GERMAN EAST AFRICA, the largest colony of Germany, on the east coast of Africa, with a coast line of 620 miles. It is bounded on the north by British East Africa, east by the Indian Ocean, south by Portuguese East Africa and British Central Africa, southwest by Rhodesia, and west by the Congo Free State. The northern boundary crosses Lake Victoria Nyanza, the western boundary passes through the middle of Lake Tanganyika, and the northeastern part borders on Lake Nyassa. It includes the Island of Mafia, in the Indian Ocean. The area is 384,176 square miles.

A narrow coastal plane extends along the Indian Ocean, whence the surface rises gradually toward the interior, where the country assumes the aspect of a wide plateau with an altitude of from 3,000 to 4,000 feet. A range of highlands extends through the central part, trending north and south, where some of the mountains have a height of 6,000 feet. The highest elevations are in the northern part, where the volcanic peak of Mount Kilimanjaro rises to a height of 19,720 feet, forming the highest point in Africa. Many streams water the country, most of which is drained into lakes Victoria Nyanza and Tanganyika, which have their outlet through the Nile and the Congo. Few of the rivers, such as the Rufiji and the Panzani, are navigable by small boats, but many streams are available for irrigation. The climate is tropical and plant life is numerous and luxuriant. Malaria prevails in the lowlands, but the more elevated regions are healthful. The annual temperature is 78° along the coast, although it is somewhat higher in the lowlands of the interior. Rainfall is excessive in some parts.

The colony has extensive deposits of coal, salt, iron, and petroleum. Gold and silver are found in the southwestern part, but mining has not been developed to a large extent. Agriculture is the chief occupation. The products include coffee, rice, wheat, tobacco, maize, cotton, and tropical fruits. Sugar beets are grown successfully in many parts of the colony. The domestic animals include cattle, horses, sheep, and goats. Timber, India rubber, tobacco, and live stock are the leading exports. Textiles, hardware, and machinery are imported. The principal ports are at Dar-es-Salaam, Lindi, Tanga, Kilwa, and Pangani. Several lines of railroads have been built, including one from Dar-es-Salaam inland, and the Cape-to-Cairo Railway is projected through the east central part.

The administration is under a governor, who is appointed by the crown and assisted by a legislative council. Dar-es-Salaam is the capital and leading seaport. Schools are maintained under the government in the leading towns, with higher instruction at Tanga, Bagamoyo, and Dar-es-Salaam. The first German settlement was made on the eastern coast of Africa in 1884, but the territory was turned over to the German East Africa Company the following year, under which trade and colonization were promoted. The Sultan of Zanzibar renounced his claims to the coast in 1891, when the colony came under the control of Germany. About 1,500 of the inhabitants are Europeans. The natives belong chiefly to the Bantu race. Population, 1914, 19,875,105.

GERMANICUS CAESAR (jĕr-măn'ĭ-kŭs sē'zēr), Roman general, born in 15 B. C.; died in 19 A. D. He was a son of Claudius Drusus Nero and accompanied Tiberius on his campaign into Dalmatia and Pannonia. In 14 A. D. he was made commander in chief of the army on the Rhine, and, when the rebellious legions offered him the sovereignty, he refused to accept the crown and remained loyal. However, Tiberius feared his popularity and recalled him. He was sent into Syria in the year 19 to engage the Parthians and the Armenians, but was poisoned by Piso, the governor of Syria, while near Antioch. He was the father of Caligula, the emperor, and of Agrippina the Younger, mother of Nero.

GERMAN OCEANICA (ô-shĕ-ăn'ē-kà), the portion of the Pacific Ocean which lies between the Coral Sea and the Marianne Islands and extends from the northern part of eastern New Guinea to the Gilbert Islands. It includes the northeastern part of New Guinea, or Kaiser Wilhelm's Land, Dampier Island, Long Island, the Bismarck Archipelago, part of the Samoan or Navigator Archipelago, two chains of the Lagoon Islands, the Eastern Carolines, part of the Solomon Islands, the Pelew Islands, the Western Carolines, part of the Marianne Islands, part of the Gilbert Islands, the Admiralty Islands, and a number of others. These islands have a considerable trade, but their administration requires imperial aid. In recent years the revenues have been improving and they will likely soon yield returns to the government.

GERMAN SILVER, an alloy of nickel, copper, and zinc in varied proportions. This alloy was first made at Hildburghausen, Germany, of 2.6 parts iron, 25.4 parts zinc, 31.6 parts nickel, and 40.4 parts copper. The proportions commonly used at present are one part zinc, one part nickel, and two parts copper. It is whiter and harder than silver and takes a high polish. Strong acids attack it and some organic acids, such as vinegar, affect it materially. It is used largely in the manufacture of forks and spoons, knife and fork handles, candlesticks, and watch cases.

GERMAN SOUTHWEST AFRICA, a colonial possession of Germany, bounded by Portuguese West Africa on the north, British South Africa on the east, and by Cape Colony and the Atlantic Ocean on the south and west. The area is 322,450 square miles. Among the chief rivers either wholly or partly in the region are the Orange, Cubango, Cunene, and Zambezi. Walfisch Bay receives the water of the rivers draining the interior. It contains the most important harbor, besides which are Swakopmund, Lüderitz Bay, and Sandwich Harbor. About 480 miles of railroads are in operation. The mission schools are attended by 5,650 students.

The coast region is sterile, but the interior is susceptible to cultivation and yields agricultural products, cattle, horses, hides, and ostrich feathers. Deposits of copper and other minerals are found in paying quantities. Since the war between the Boers and British a considerable number of Boer agriculturists settled in the fertile regions of the interior and are aiding in rapidly developing its productive resources. German merchants established trading posts on the coast in 1883. Several insurrections have been raised by the native Hereros, but they were finally subdued in 1906. Other native tribes include Hottentots, Bushmen, and Bechuanas. Windhoek, on Wolfisch River, is the capital and has railway connection with Swakopmund. The colony was captured by the British in 1915. Population, 1914, 247,715.

GERMANTOWN, a town which was annexed to Philadelphia, Pa., in 1845. It was the scene of an important battle between the American army under Washington and the British under Howe, on Oct. 4, 1777. Howe occupied Philadelphia and sent a detachment to seize forts Mercer and Mifflin, which caused Washington to make an attack at Germantown, where he hoped to crush the British. Early in the morning two columns of the American army advanced upon the village under Sullivan and Greene, but the Americans were thrown into a state of confusion on account of a heavy fog which occasioned a mistake and led Greene to charge upon the left center of the American army, causing a panic and the loss of the battle. Washington conducted a retreat in good order before the advance of Cornwallis, who had hurried from Philadelphia with two battalions. The American loss was 673 men and the British lost 575. Germantown was settled by Palatinate Germans in 1683. They established the first paper mill in America at this place in 1690 and published the first American edition of the Bible in 1743. At present it is a pleasant part of Philadelphia, about six miles north of the center of the city, and has fine gardens and superior buildings.

GERMAN UNIVERSITIES, the term applied to the more important institutions of learning founded in the German-speaking countries, but located principally in Germany, Austria, and Switzerland. These institutions are the most efficient and constitute the greatest organizations of institutional learning in the world. Twenty-one of these institutions are in Germany, of which thirteen are Protestant, four are Roman Catholic, and four have mixed faculties. This system includes 4,820 instructors and professors and about 48,500 students, and numbers among the alumni some of the leading thinkers and writers, both living and dead. The institutions maintained in Berlin, Munich, Leipzig, Bonn, Freiburg, Halle, Breslau, and Göttingen are the largest. However, the University of Heidelberg is the oldest, having been founded in 1386. Those classed as Roman Catholic are at Freiburg, Munich, Münster, and Würzburg and those having both Protestant and Roman Catholic faculties are at Bonn, Breslau, Strassburg, and Tübingen. All the courses of study articulate with those of preparatory schools, though foreigners are admitted to membership without examination on certificates from foreign institutions of recognized merit.

The discipline is rigid and expulsion from one university constitutes a bar to admission to the others. In the higher courses are included medicine, philosophy, theology, and law, though the natural sciences, civics, higher pedagogy, music, political economy, civil and electrical engineering, architecture, and other departments are maintained. The studies are largely elective, which gives students the privilege of pursuing such advanced work as seems best adapted to their needs, while they may enroll contemporaneously in different institutions for the purpose of taking additional and supplementary work. These universities are under the control of appointees of the government, who constitute, with the minister of public instruction, the managing, directing, and guiding officers for particular institutions.

The expense of maintaining these universities is borne largely by the state, only about ten per cent. being paid by students in the form of fees. Among the university museums, libraries, and publications those of Germany take high rank. In all the great centers of learning are adequate requirements to facilitate references and home reading, while the

scientific societies, especially those which foster original research, are represented by a wide range of organizations. Instruction is mostly by lectures, the preparatory work being done largely in laboratories and during private hours. Students may secure lodging and board in private families, but ample facilities are provided at the dormitories and may be utilized at small expense. Most of the courses cover four years of work, though in medicine it is often five. The class of degrees issued depends largely upon previous preparation. A large proportion of the students are from foreign countries, including many from America, for whose accommodation advanced and special postgraduate courses are maintained in some of the institutions.

The leading German universities of Austria-Hungary are at Vienna, Graz, Innsbruck, Czernowitz, and Prague, but the last mentioned maintains a faculty in Bohemian. Basel, Bern, Geneva, Lausanne, and Zurich have the chief German universities of Switzerland. The alphabetical list of the universities of Germany is as follows:

Berlin,	Kiel,
Bonn,	Königsberg,
Breslau,	Leipzig,
Erlangen,	Marburg,
Freiburg,	München,
Giessen,	Münster,
Göttingen,	Rostock,
Greifswald,	Strassburg,
Halle,	Tübingen,
Heidelberg,	Würzburg.
Jena	

GERMANY (jĕr'mȧ-nĭ), or **German Empire,** one of the great powers, situated in the north central part of Europe. From east to west it extends through 17° of longitude, about 750 miles, and its breadth is 600 miles. Its northern boundary is formed by Denmark and the North and Baltic seas; eastern and southern by Russia, Austria-Hungary, and Switzerland; and western by France, Belgium, and Holland. The coast on the North and Baltic seas has a length of 1,200 miles, which is equal to about one-third of the entire frontier. The position occupied by it brings it in closer touch with the leading nations of Europe than any other country and the leading highways of the continent pass through it. It has a total area, exclusive of the colonial possessions, of 212,028 square miles, about one-sixteenth of that of all Europe.

SURFACE. The northern one-third is a low plain and the remainder of the empire may be classed as highland. In the southwestern part, on the boundary of Switzerland, are the high elevations of the Alps. Toward the north of these, extending far into central Germany, are the Mittelgebirge, or Secondary Mountains, and north of these are the low plains. No great elevations exist, the highest being the Bavarian Alps, of which Zugspitze, in Bavaria, is the culminating peak. It has an altitude of 9,675 feet. Other elevations include the Vosges, 4,710 feet, and Feldberg, in the Black Forest, 4,910 feet. The Harz Mountains are near the central part, forming the northern elevations of the highland. Toward the south of these are the Black Forest, the Bavarian Forest, and the Swabian and Franconian Jura. Connected with them by lower ranges are the ridges of the Erzgebirge, the Böhmerwald, the Riesengebirge, and the Fichtelgebirge. All of these elevations have rounded summits and in and through them extend broad valleys of great fertility. Numerous streams water the highland and fine grasses and forests are abundant. Many inlets characterize the shore, but the good class of harbors are confined to the mouths of rivers, where the streams have worn channels through the rather shallow sea. The lowlands form a somewhat sandy plain, which is diversified by elevations attaining heights of about 750 feet. In the northeastern part are many lakes, including a number of inlets known as Haffs, of which Kurisches Haff and Frisches Haff are the most important. In the southern part are Chiem See, Ammer See, and Lake Constance, the last mentioned forming a part of the boundary with Switzerland.

DRAINAGE. Three drainage basins characterize the surface: those of the Danube, of the North Sea, and of the Baltic Sea. They are penetrated more or less by tributaries of navigable streams and the valleys are formed of loam mixed with sand. The greater portion is drained toward the north into the North and Baltic seas by the Vistula, Oder, Elbe, Weser, Ems, and Rhine, each of which receives the inflow from numerous tributaries. Its southern part, especially Bavaria, is drained by the upper Danube and its numerous affluents into the Black Sea. The Memel and the Pregel drain the extreme northeastern part, and the Vistula, which rises in Russia, flows through the eastern section into the Gulf of Dantsic. The Rhine, in the western part, has its lower course in Holland and is the most important highway of commerce. The rivers are largely connected by canals and furnish a vast network of means to navigate the interior, while many jetties have been constructed to deepen and improve the rivers.

CLIMATE. Germany has a temperate climate and the high elevations of the southern part render it quite equable. The colder section is in the northeastern part, bordering on the Baltic, and the warmer region is in the basin of the Rhine. Ice obstructs navigation a part of the year at the ports of the Baltic, but those of the North Sea are open practically the entire year, where the climate is influenced noticeably by the warm winds from the Atlantic. The

mean temperature for the year is about 70°, ranging somewhat above that in the southern part and a little below it in the northern part. All sections of the empire have an abundance of rain for the germination and growth of all classes of plants common to the Temperate Zone, though it varies considerably according to locality and season. The heaviest precipitation is in the vicinity of some of the mountain ranges, where it reaches 40 inches, while the northern section has from 25 to 30 inches. Heavy storms and winds do not prevail, but the northern part has a heavy snowfall.

FLORA AND FAUNA. Nearly one-fifth of the empire is covered with forest, consisting chiefly of deciduous trees, and these receive as much care as the cultivated fields. Among the chief species are oak, elm, beech, fir, and pine. Coniferous trees are most abundant in the eastern part, and the beech may be said to be the most prominent tree in the eastern section. More than seventy per cent. of the entire area is under cultivation, either for agricultural or horticultural purposes.

Small game is abundant in the forests and wolves and wild boars are found in reservations and some of the mountains. The wild goat, marten, fox, otter, deer, chamois, and badger frequent the Alpine region, and the elk and fallow deer are protected in the preserves. The region of plains in the north is frequented by aquatic birds, such as the duck, snipe, and goose, which migrate there from the northern seas. Storks are abundant and are frequently found in the high buildings of cities, where they are protected by government regulations. The coast and stream fisheries are very valuable and produce merchantable quantities of the clam, eel, trout, salmon, carp, tunny, and oysters.

MINING. The geological formations are diversified, the principal characteristics being the recent sand loam deposits of the northern portion, Jurassic rocks in the central part, and Palaeozoic rocks in the southern section. Mining is an important enterprise, especially in coal and iron, in which Germany takes third rank, being exceeded only by Great Britain and the United States. These minerals are widely distributed over the country, especially in the southwestern part, and the output comes largely from Bavaria, Baden, and Alsace-Lorraine. A large number of the mines are owned and operated by the government. Formerly bituminous and anthracite were mined exclusively, but the larger demand for fuel in the manufactories has caused a large output of lignite coal. Prussia is a heavy producer of copper, lead, zinc, nickel, and cobalt, though these minerals are distributed more or less over the empire. The silver mines take rank as the richest in Europe. Rock and other salts and potash salts are abundant. Other minerals include limestone, granite, sandstone, petroleum, and ocher. The quarries yield a large output for building purposes and monumental work.

AGRICULTURE. About two-thirds of the surface is in a high state of cultivation and is used either for pasturage or the growing of crops. Though one-third of the people engage in agriculture, the products are not sufficient to supply the demand. Great care is exercised in cultivating the soil, and many of the hillsides and mountain slopes are terraced to make husbandry possible. A large majority of the farms are small, ranging in extent from five to twenty acres, and the number that exceed 300 acres is comparatively insignificant. Modern methods are employed in all departments of farming, and a large number of steam plows, seeders, self-binding harvesters, and steam threshers are in use. This is accounted for largely by the increase of manufacturing enterprises, which have been the means of producing and introducing newer methods.

Rye is grown most extensively of the cereals, and is cultivated on about three times more land than either wheat or barley, though these can be raised profitably in all sections of the empire. Oats take second rank among the cereals. Corn is grown chiefly in the southern part. The acreage of hay is about equal to that of rye, being an important crop on account of the extensive interests in dairying. Germany has first place in the production of sugar beets and in this product has made greater progress than any other country, the enterprise being encouraged by bonuses paid by the government. The vine is a staple product along the Rhine, Main, Moselle, and in Swabia and Brandenburg, and the Rhine wines are famous in the markets of the world. Garden vegetables of all kinds, flax, tobacco, hops, barley, spelt and rape are cultivated extensively. All classes of domestic animals thrive, but the largest share of attention is given to raising cattle for their meat and dairy products. Next in the order of importance are horses, sheep, swine, and goats. The Prussian studs and the Holstein cattle have a wide reputation.

MANUFACTURING. Germany ranks as the third manufacturing country of the world, being exceeded in the output only by Great Britain and the United States. About forty per cent. of the entire population are engaged in manufacturing enterprises, which include about 275 distinct industries. In the production of beet sugar it takes first rank, and it is classed among the leading nations in the output of steel and iron manufactures. However, the largest per cent. of persons engaged in any of the manufacturing industries are employed in making clothing, and those next in order are the building trades and the manufacture of foods. The textile industry furnishes a very large share of the commodities exported, especially the preparation of flax and the weaving of linen fabrics, although the output of cotton and

woolen goods takes high rank. Other enterprises of this class include those of the velvet, silk, carpet, lace, and damask industries. Large interests are vested in the manufacture of toys, scientific instruments, armor plate, hardware, sailing vessels, spirituous liquors, earthenware, leather, paper, and heavy artillery pieces and projectiles. Large shipyards are located at Hamburg, Stettin, Bremen, Kiel, and Dantzic. Germany has extensive interests in the manufacture of rubber and gutta-percha goods, carved wooden specialties, clocks and musical instruments, and glassware.

TRANSPORTATION. Germany had an extensive system of transportation even before steam and electricity came into use, which consisted of well-improved highways, canals, and navigable streams. The Rhine, Elbe, Weser, Oder, and Vistula are navigable, and these and others have been materially improved by the construction of jetties and canals. Among the principal canals are the Finow, 40 miles long, in Brandenburg; the Ludwig's, 110 miles, in Bavaria, which unites the Black Sea and the North Sea by connecting the Danube and the Main; and the Kiel and Ider Canal, 21 miles, which unites the North and Baltic seas. The Great Canal extends from Kiel to the Elbe, facilitating the movement of the largest vessels, and is now used extensively for commerce between the North and Baltic seas. The Kaiser Wilhelm Canal affords a short outlet from the Baltic to the Atlantic.

Germany has 39,943 miles of railway lines and is exceeded in railroad mileage only by Russia and the United States. These lines are owned principally by the national government, or by that of the states, and they are operated as public enterprises. Berlin is the most extensive railroad center in the empire, but lines penetrate every section of the country. In addition there are a large number of electric railways, both in the cities and throughout many parts of the country. The government maintains an efficient mail service and systems of telephone and telegraph lines. Stone and macadamized highways are numerous and in good condition.

COMMERCE. The foreign commerce of Germany is of vast importance and is exceeded only by that of Great Britain. At present the annual imports aggregate $1,750,000,000 and the exports, $1,500,000,000, being larger than the combined exports and imports of the United States, which aggregate $2,750,000,000. Textiles, chemicals, coal, machinery, scientific instruments, leather goods, and clothing are the chief exports, while the imports consist principally of breadstuffs and raw materials. The greater share of trade is with Russia, Great Britain, the United States, Austria-Hungary, France, Argentina, India, Belgium, the Netherlands, Italy, and Switzerland.

COLONIES. The development of colonial possessions and commercial interest is a national policy. Its colonies include Kamerun, German East Africa, Togoland, German Southwest Africa, Kaiser Wilhelm's Land, the Ladrones, the Carolina Islands, the Marshall Islands, Kiauchua in China, the Bismarck Archipelago, the Pelew Islands, the Marianne Islands, the Solomon Islands, and part of the Samoan Islands. These possessions have an area of 1,027,950 square miles and a population of 12,500,000, and are governed through a centralized bureaucracy. Trade with the colonies has increased steadily the past decade, the imports amounting to $12,500,000 and the exports from the colonies being $7,500,000, of which the mother country received about fifty per cent. The expenditures on account of the colonies have been somewhat larger than the receipts, though the burden has been lessened materially by the development of a growing trade.

EDUCATION. The educational affairs of Germany are in a prosperous and effective condition, its schools, colleges, and universities taking the highest rank among the nations of Europe. For many years it was the land of pedagogy, in which teachers flourished who gave impulse and enthusiasm to its educational arts, promulgated basic principles vital in the education of man, and paved the way for progress in other lands. Elementary schools, or *Volkschulen*, are supported in all communities, while institutions disseminating knowledge of industry, arts, sciences, and higher education are established and maintained under state and national supervision. The elementary schools include 61,500, in which 125,500 teachers give instruction and 8,980,000 pupils attend. Higher education is centered in 21 universities, at the head of which is the University of Berlin (q. v.), and the Lyceum Hosianum at Braunsberg, which has faculties in theology and philosophy. The institutions of secondary learning are numerous, including scientific schools, academies, and gymnasiums. The universities carry courses in medicine, law, theology, and philosophy. Many of these institutions are equipped to teach political and domestic economy, civil and electrical engineering, the natural sciences, and the trades, and all have museums, libraries, and collections of art. The scholars of Germany are renowned for faithful research, patience, and thoroughness, and have given the world many authorities on the important sciences and for professional reference. Newspapers, magazines, and periodicals have a wide circulation and are made up of superior educational, scientific, and intellectual material. Attendance at school is compulsory from six to fourteen. The number of normal schools for the training of teachers is reported at 185.

GOVERNMENT. Germany may be considered the successor of the Holy Roman Empire, which came to an end in 1806. However, Aus-

tria does not belong to the present confederation. The states included at present are the four *kingdoms* of Bavaria, Prussia, Saxony, and Württemberg; the seven *grand duchies* of Baden, Brunswick, Hesse, Mecklenburg-Schwerin, Mecklenburg-Strelitz, Oldenburg, and Saxe-Weimar; the four *duchies* of Anhalt, Saxe-Altenburg, Saxe-Coburg, and Saxe-Meiningen; the seven *principalities* of Lippe, Reuss-Greiz, Reuss-Schleiz, Schaumburg-Lippe, Schwarzburg-Rudolstadt, Schwarzburg-Sondershausen, and Waldeck; the three *free cities* of Bremen, Hamburg, and Lübeck, and the *crown land* of Alsace-Lorraine.

The government is a constitutional monarchy, based upon the constitution adopted in 1871, which recognizes the *Kaiser,* or emperor, as the highest executive officer. It provides that all the states of Germany are to "form an eternal union for the protection of the realm and the care of the welfare of the German people." The office of emperor is hereditary and in it is vested the power to represent the empire in concluding treaties and alliances, declaring war, and concluding peace, and the emperor has chief command of the army and navy. Internal trade is free, while a high protective tariff is in force in relation to other countries, which, with the revenues from railroads, telegraphs, the postal system, and excises, constitutes the chief source of government receipts. The legislative power is vested in the upper and lower houses, which are known as the Bundesrath and the Reichstag. In the former are 58 members, appointed by the several states, and the latter has 397 members, elected by a universal ballot. The term of office in each branch is five years. The chancellor is appointed by the emperor and is the president of the Bundesrath. He has a seat in the lower house by virtue of his office, where he represents and defends the government in public measures and policies. In his general duties he is assisted by eleven secretaries, who are at the head of the several departments of the government. The proceedings of the legislative branch are public. A bill, to became a law, must have a majority vote in both branches, be assented to by the emperor, and receive the signature of the chancellor.

The political parties are organized similarly to those of Canada and the United States and include the liberal, conservative, and clerical. The liberal party advocates a united Germany on constitutional lines, the conservatives constitute the imperial party proper, and the clerical, known also as the ultramontane, is the Roman Catholic Party. These, besides the social democratic and several other parties, comprise the leading factors and are maintained by aggressive organization work. The 25 states and the crown land of Alsace-Lorraine are pledged to a perpetual union, none of which has the power to secede or withdraw from the confederation. The laws of the empire are fundamental and all others must harmonize and conform to them.

Every male citizen of sound health and constitution is required to serve three years in the imperial army, in the reserve four years, and in the militia or landwehr five years. No one may be represented by a substitute, but the three years' compulsory service may be reduced one year by the completion of a course in the gymnasia. The navy has been enlarged within recent years, especially since the war with China in 1900, and now comprises one of the most powerful in the world. It includes 30 first-class battleships, 45 cruisers, 125 torpedo boats, 18 dispatch vessels, and numerous others. The peace footing is 510,350 men and 23,500 officers; the war footing, 3,450,000 men. As a whole the army and navy are well organized and thoroughly disciplined and constitute an effective and mobile force.

INHABITANTS. The people of Germany are classed as Low German and High German. This classification includes, respectively, the people of North and South Germany, the term being applied on account of the difference of elevation in the different sections. Emigration from Germany has exceeded that of any other country, except Ireland. The number of Germans in the United States is about 8,000,000, exclusive of the American descendants who have lost the identity of language. The total number of German people residing in other countries is about 50,000,000, of which the greater number reside in the United States, Austria, Switzerland, Belgium, Russia, and Australia, and they are otherwise distributed to various sections of the world and in colonies. About 65 per cent. of the population of the empire are Protestants and 35 per cent. Roman Catholics, the latter being resident most largely in Alsace-Lorraine, Bavaria, and Baden.

In 1905 the population was officially reported as 60,641,278, and in 1911 it was reported at 65,003,500. It ranks next to Russia in population of the European countries, but its density is greater, being about 310 to the square mile.

Nineteen cities have a population of over 200,000. These include Chemnitz, Charlottenburg, Stettin, Düsseldorf, Essen, Magdeburg, Bremen, Hanover, Nuremberg, Frankfort-on-Main, Cologne, Dresden, Breslau, Leipzig, Königsberg, Munich, Hamburg, Stuttgart, and Berlin. In 1910, Berlin, the capital, had a population of 2,070,695, and Greater Berlin, which includes a number of suburbs, had a population of 3,709,504. The remarkable growth of German cities within recent years is accounted for by the vast increase in the manufacturing enterprises.

LANGUAGE. The German language is a branch of the Indo-European group of languages. It is commonly divided into three parts, known as

Old High German, Middle High German, and New High German. In this classification the word "high" has a mere geographical distinction, and is used to distinguish from the German spoken in the low countries, which is known as *Plattdeutsch*. As to time the periods are classified to include the years 600-1100, from the rise of the Franks to the Crusades; 1100-1500, from the Crusades to the Reformation; and from 1500 to the present. While the different provinces still have a somewhat variant dialect, the official language and that taught in the schools is universal, and there is a constant tendency to unify the spoken tongue in all parts of the region where the German language is officially recognized. The language is especially rich in synonyms, making it prolific in words to express emotion and adapting it to the purposes of the orator and poet. There is little difference between the German alphabet and that of the English, but the orthography and pronunciation differ considerably. While the grammar is more complicated by the fuller inflection and conjugation of words, it is notable that the orthography is much more in line with natural sounds, and as a result spelling and pronunciation are less difficult.

LITERATURE. The year 600 A. D. is fixed as the time when Gothic influence began to decline and the Franks took the lead in German history. After gaining control of Middle and South Germany, they embraced Christianity. Collections of folklore and legends were made as early as the time of Charlemagne. That distinguished sovereign not only encouraged literary art, but also made a collection of popular German poetry, mostly songs. The age of the Minnesingers, or singers of love, began about 1200, when companies of poets visited the castles and courts of nobles, where they sang the story of King Arthur and the history of Troy. To this period belong the "Nibelungenlied" and "Gudrun," in which the story of the heroic combats of Siegfried is related, and in them is a detailed account of how Griemhild, the beautiful daughter of King Gunther, was won by the gallant Siegfried. They relate the story of sinking the Nibelungen treasure in the Rhine, detail the death of Attila the Hun, and give a glowing account of the death of Hagen at the hands of Griemhild.

Another epoch is marked by the introduction of the mysteries and passion plays. These plays attained to the height of popularity in the 15th century, and not only gave rise to the German drama, but still continue in such interesting exhibits as are periodically witnessed at Oberammergau. Though all these and Walther von der Vogelweide, the greatest of the Minnesingers, had an extended influence upon the language and literature, it remained for Martin Luther to institute the era known as that of the New High German. This he did by translating the Bible into the German, thereby giving the language a fixed literary value, and he also wrote many songs which still engage the attention of singers in many tongues. Hans Sachs (born in 1494) was a contemporary of Luther, and his permanent place in literature is due to the 6,048 poems from his pen.

Johannes Fischart (1545-1591) is the author of numerous works, including "Christian Education," "The Luckship," and "The Marriage Book," the last named depicting the joy and peace of home life. To this epoch belong the popular stories written by the same author known as "The Wandering Jew" and "Eulenspiegel." The 17th century witnessed a period of great revival in learning and culture. At this time were translated many of the classics, while biography, romance, history, and philosophical works received marked attention. Martin Opitz (1597-1639) is the author of "German Poetry," a work celebrated on account of its purity in language and diction. Other writers of this period include Paul Gerhardt (1607-1676), one of the greatest hymn writers.

German literature in the 18th century became quite free from foreign influence, and exercised a marked impression in Switzerland and the low countries. Johann Gottsched (1700-1766), is the most eminent literary man of the early part of the 18th century, and may be regarded the most eminent philologist prior to Grimm. His chief writings include the drama, "Dying Cato," while Johann Jakob Bodmer (1698-1783) translated "Paradise Lost" and published the "Nibelungenlied." Frederick Gottlieb Klopstock (1724-1803) is one of the noted poets of this period and the author of a religious epic entitled "Messias," while Christoph Wieland (1733-1813) takes high rank with the cultured poets. His best known productions include "Oedron," a tale of fairy lore, and he made numerous translations from Shakespeare. However, the most eminent poet of this period is Gotthold Lessing, who not only published comedies and tragedies of much value, but greatly benefited literature by elevating style through efficient criticism. His writings include "Nathan the Wise," "Hamburg Dramaturgy," and "The Young Scholar." J. G. Herder (1744-1803), a contemporary of Lessing, is noted chiefly for his searching criticisms. Among the eminent writers of the latter part of the 18th century are J. W. von Goethe and J. C. F. Schiller, two of the most distinguished characters in German literature. The names of these two writers are inseparably linked to each other, and their productions rank with the most eminent in the world's literature. See **Articles.**

The system of public schools and universities of Germany placed the literature on a high plane, a result to be expected from the fact that its scholars are recognized the foremost in the world. Among the philosophical writers are such eminent men as Schelling, Haeckel, Kant, Fichte, Hegel, Lotze, Schopenhauer, and von

Hartmann, whose productions have been widely translated. The historians include Niebuhr, Ranke, and Mommsen; the biblical writers, Strauss, Schleiermacher, Paulus, Neander, De Wette, and Baur, while Humboldt, Agassiz, and Max Müller, who wrote both in German and in English, hold eminent places as naturalists and scientific inquirers. Heinrich Heine, Ludwig Uhland, August von Schlegel, Ferdinand Freiligrath, and H. Fallersleben are classed with the later poets, Karl Gutzkow (1811-1878) and Gustav Freytag (1816-1895) are among the novelists, and George Ebers takes rank as an Egyptologist and general writer, producing among others "Cleopatra," "In the Blue Pike," and "Barbara Blomberg." The satirists include Jean Paul Richter; the humorists, Fritz Reuter; the dramatists, C. F. Hebbel, and the miscellaneous writers, Gottfried Keller, Paul Heyse, and Wilhelm Jordan. The Grimm brothers are noted for their eminent services to philology.

German literature includes the best known authoritative works on music, and the master musicians have so fully touched the hearts of the people that their names are known in all civilized lands. These include such eminent composers as Mozart, Bach, Beethoven, Haydn, and Handel, in the 18th century, and Meyerbeer, Mendelssohn, Weber, Wagner, Schumann, Schubert, Liszt, and Franz Abt (1819-1885), in the 19th century. Among the eminent educational writers are Froebel, author of "Education of Man;" Henry Pestalozzi, writer of "How Gertrude Educates Her Children;" and Kant and J. F. Herbart, two well-known philosophers and writers of works on psychology. Among the eminent writers of the 20th century are Hermann Sudermann (born in 1857), who takes high rank as a novelist and dramatist, among his productions being "Dame Care," "Sodom's End," "Love in a Grove," and "Honor." Gerhart Hauptmann (born in 1862) is famous as a dramatist, his works including "Weavers" and "Sunken Bell." Other writers of this period include the historians, Ludwig Hartmann, Hans Prutz, Paul Hassel, and Johann Penzler; the literary critics, P. Schwanke, Karl Federn, B. D. Diederich, and M. Neckar; and the writers of fiction, Max Dreyer, Wilhelm Polenz, Hermann Stehr, William Armenius, and Paul Lindau.

HISTORY. The German people are descendants of the Indo-Germanic or Aryan race. In history they are first mentioned in the year 113 B. C., when they came in contact with the Romans. At that time they occupied a region east of the Rhine and north of the Danube, and were divided into numerous separate and independent tribes, being bound together by language and racial ties. In the time of Alexander the Great the Germanic tribes of the Baltic coast were met with, but the first authentic history of them appeared in the "Commentaries" of Julius Caesar in 58 B. C. The Celtic name given to these tribes was *Germani* and was the name used by the Romans, but the term by which they designated themselves was the present name *Deutsch*, meaning people. There were about fifty tribes, most of which were united in the 1st century and succeeded in overthrowing Roman control, driving the legions of Varus from their possessions. In the year 200 A. D. the Germanic peoples invaded the territory of the Romans and threatened their capital. Later the different tribes formed numerous groups, the most powerful being known as the Frisians, Burgundians, Saxons, Goths, and Franks. Soon after the Huns, who were pressing them southward, caused them to cross into the Roman Empire, and for many years they controlled more or less of the former Roman possessions.

The Franks under Clovis defeated the Roman governor in 486 and established their seat of government near the present site of Paris. After subduing the Alemanni, Visigoths, and other minor tribes, Clovis became the ruler of Gaul, and, after his death, in 511, these possessions were divided among his four sons. The dynasty of Clovis was known as the Merovingian and controlled the destiny of the German tribes until the rise of Charlemagne, who became emperor in 800, founded the Carlovingian dynasty, and gave rise to a long line of kings and emperors who for more than 1,100 years occupied the throne of Germany. The empire of Charlemagne, known as the Holy Roman Empire, was reared on the ruins of Rome. It brought about marked changes in the civilization and intellectual status of the Germans, and impressed them with a nationalism sufficient to endure, though it was suppressed at intervals. The vast empire was divided among the successors of Charlemagne and subdivided successively until many small principalities with potentates having absolute power came into existence. In 887 the French and Germans became finally separated, at which time there existed five powerful divisions among the Germans. These constituted the Bavarians, Saxons, Lorrainers, Swabians, and Franks, of whom the last were the most powerful, and in 911 succeeded the descendants of Charlemagne in the government of Germany. Duke Henry of Saxony is counted the founder of the German Empire, since he was the first to establish a government distinctly German, and largely strengthened the five dukedoms by greatly reforming the military system, building fortresses, and providing for internal improvements. The Saxons reigned about one hundred years, during which time the Wends rose in rebellion in 928 and the Magyars in 933, and other local differences occurred. However, the Saxons maintained their sovereignty and were followed by the house of Franconia, which ruled until 1125.

Conrad II. was the first Franconian king

He ruled energetically in 1024-39 and succeeded in subduing the nobles and establishing an alliance with Canute, the celebrated Danish king. In 1138 the Hohenstaufen dynasty began its reign with Conrad III. (1093-1152), who ranks as one of the most celebrated kings of mediaeval history. The reign of this dynasty is noted because of prolonged conflicts between the imperial powers and that of the Pope and for the organization of the early Crusades, Frederick, surnamed Barbarossa, being the most celebrated in this line. The first Crusade was undertaken in 1095. In the second, organized in 1147, Conrad III. took a conspicuous part. He amalgamated the strength of his nation into a vast army, but both he and his soldiers perished in an attempt to reclaim the Holy City, his death occurring in the third Crusade, after a reign of fourteen years. The Hohenstaufens governed until 1273, when the Carlovingian line became extinct, and the next king was chosen by the nobles, who, after long contests, decided upon Rudolph I., founder of the Hapsburg dynasty, which is still the ruling line in Austria. Within the period of his reign the royal authority was largely extended, important conquests were made in southeastern Germany, and the influence of the princes was curtailed largely.

In the reign of Albert of Austria, in 1298-1308, began the prolonged revolutionary movements for the independence of the Swiss cantons. Within the succeeding century occurred sanguinary contentions among rival claimants of the throne, and in 1415, in the reign of Sigismund, terminated the persecutions of the followers of John Huss, who was burned at the stake on a charge of heresy, but this event was only a forerunner of the Reformation. Luther began to preach the Protestant faith under Maximilian I., and the reign of Charles V., from 1519 to 1556, fully grounded that faith in Germany. The seeds of civil discord germinated during the great religious movements resulted in the Thirty Years' War, which began its depressing ravages in 1618.

The weakened condition of commerce, the stagnation of interior trade, and the heavy burdens of taxation occasioned by the prolonged war brought a desire for the cessation of hostilities, which was first secured by the Peace of Augsburg. However, the terms of the treaty gave offense to various adherents of Luther, Calvin, and the Catholics, and war soon broke out anew. In the meantime Wallenstein led the army against Bohemia for the extermination of the Protestants, and these movements continued until the Swedes, under Gustavus Adolphus, came to the rescue of the Protestants, when the latter obtained his memorable victory at Lützen in 1634. The ascension of Ferdinand III. to the throne, in 1637, made possible the Treaty of Westphalia in 1648, which adjusted religious matters, though Germany was divided into 203 independent states, and each gave only nominal support to the emperor. Besides, Switzerland and the Netherlands were separated from the empire, while Alsace was ceded to France. After the Treaty of Westphalia, Prussia gained strength and became the controlling power in Germany and the stronghold of Protestantism. This led to the rise of the house of Hohenzollern, as the house of Hapsburg was Catholic, giving Prussia marked advantage over Austria. In 1702-13 the war of the Spanish Succession brought marked glory to the rising power of Germany, but it did not operate to solidify and strengthen the internal affairs of the empire. Soon after, in 1756-63, occurred the Seven Years' War, which gave Prussia additional advantages over Austria. Frederick the Great of Prussia strengthened the power of the army, replenished the treasury, and made that country the center of German unity.

The power of Germany was almost destroyed by the wars immediately following the French Revolution. In 1806 Francis II. resigned the title of Emperor of Germany, having assumed that of Emperor of Austria, with which the Holy Roman Empire ended. In 1813 the allied forces of Prussia, Russia, Sweden, and England frustrated the plans of Napoleon to add most of the German states to France, at the Battle of Leipzig, and the vigorous assault of Blücher with 30,000 Prussians destroyed his last hope at Waterloo in 1815. The congress of Vienna now endeavored to restore order and organized a German Confederation, of which the Emperor of Austria was chosen president, Frederick William III. as ruler of Prussia, receiving one-third of Saxony. In 1848 the national assembly, which met in Berlin for the purpose of framing a national constitution, was prevented from rendering material aid by the rivalry of Austria and Prussia, and was followed by a Revolution, but Frederick William IV. restored order by promising a constitution. The growing popularity of Bismarck and his firm rule led to a final union of many of the states.

In 1866 occurred the war between Austria and Prussia, known as the Seven Weeks' War, which was the last great struggle for German unity, and, under the leadership of von Moltke, the Austrians were utterly routed at Sadowa, in Bohemia, on July 3. The Prussians occupied Vienna on August 23, and the war terminated after seven weeks. In the peace treaty which followed Austria was shut out from the federation formed north of the Main River. France, jealous of the rising power of the house of Hohenzollern, found occasion to declare war when Leopold, a member of the family, was offered the crown of Spain. War was declared on July 19, 1870, and the South German states were enthusiastic from the first in supporting Prussia, while the northern

states showed an equal degree of interest in the cause of unity. Two powerful armies invaded France and by a spirit of marked enthusiasm won battle after battle, captured Napoleon III. with an army of 90,000 men, and sent him to Germany as a prisoner. A siege of Paris caused that city to surrender on Jan. 29, 1871. The treaty which followed required France to pay $1,000,000,000 as a war indemnity and cede Alsace and the German portion of Lorraine to Germany. The most important result of the war with France was the solidification of the German states, the development of a spirit of nationalism, and the restoration of the old empire. King William was proclaimed emperor with the title of William I. on Jan. 18, 1871, before leaving the capital of France, and was received on his return by his own people with signal demonstrations.

Among the subsequent events of the empire are its constant growth of influence, colonial expansion, the building of great railroads and canals, and vast improvements in economic and social life. The triple alliance formed by Germany, Austria, and Italy on March 9, 1888, strengthened the peace aspect of Europe and was renewed by Caprivi, the chancellor who succeeded Bismarck. William I. was succeeded by Frederick, his son, on March 9, 1888, but the new emperor suffered from a cancerous affection in the throat and died June 15, and was succeeded by his son William II. The latter at once adopted the policy of William I. and Bismarck in extending the colonial empire, enlarged the army and navy, and vigorously supervised the internal conditions of his dominion. He visited many of the leading courts of Europe in 1889, two years later he appointed Chancellor Caprivi to succeed Bismarck, and in 1894 selected Prince von Hohenlohe for that position.

William II. visited Palestine in 1898, where he took a prominent part in consecrating an Evangelical church, the Church of the Redeemer, at Jerusalem. The empire became involved in a controversy with China in 1900, owing to the murder of the German minister at Pekin, Clemens A. von Ketteler (1853-1900), and sent an army and warships for the purpose of securing to the empire an adjustment of important issues between the two nations. Other complications followed and led to an alliance of European powers and the United States, the allied army being commanded by Count Waldersee. The contentions resulted in an extension of foreign interests in China, Germany securing its share of the benefits, in addition to a payment for individual damages sustained. Count von Bülow became chancellor, in 1900, and in 1909 was succeeded by Theobald von Bethmann-Hollweg (born in 1856). In 1914 the empire became involved in the Great European War. See **War.**

GERMINATION (jĕr-mĭ-nā'shŭn), in botany, the sprouting of a plant from a seed. It depends upon the seed coming in contact with moisture and warmth at the proper time. Few kinds of seeds will grow after keeping them for five or six years, while some must be brought in contact with the ground as soon as they ripen, and others may be kept safely for fifty or sixty years. It is impossible to tell whether the germ of a seed will grow, and this can be determined only by placing it in a condition under which it will germinate. The seed of the soft maple ripens in the spring and germinates in early summer, while corn and wheat can be kept several years, and the seed of the sensitive plants have been preserved over fifty years.

A seed consists of two parts, the *embryo* and the *cotyledons*. The former is a miniature plant and the latter is the food stored to promote its growth. Seeds differ in the number of cotyledons; corn and rye have but one, the bean and pea have two, while the pine and a number of others have more than two. When the seed is brought in contact with moisture and warmth, it swells a little and the tiny stem of the embryo begins to lengthen and soon bursts through the coats of the seed. Later the two leaves straighten and grow larger and the seed coats are thrown off, leaving the plantlet stand in the soil. It must be observed that the little stem which first comes out of the seed turns downward and points into the earth, giving rise to the roots and rootlets, while the other end of the stem turns upward and lengthens into the stalk and leaves. It is not known why the roots grow downward and the stem turns upward, though some botanists assert that these phenomena are due at least in part to the rotation of the earth upon its axis.

The seedling plant is complete in all parts at the time of germination and it develops into a matured organism through growth. It has all the organisms of vegetation found in any plant before blossoming, and its life and development depend upon nutriment derived from the soil and the air. As the root begins to branch out into *rootlets*, a little bud called the *plumule* appears on the top of the stem, just between the stalks of the two seed leaves, and it enlarges and develops into a leaf. This leaf is soon raised upon a new piece of stem, which carries it upward a short distance, and another leaf soon appears on the summit of this joint of stem, and is likewise raised upon its joint of stem. At an early stage of growth the plant obtains food wholly from the cotyledon, later it is nourished partly by the cotyledon and partly by the soil and air, and in due time the nourishment is derived entirely from the soil and air and the cotyledon, which has now become useless, falls off, though in some plants it is consumed entirely by the young growth.

The nourishment in the cotyledon consists in its starch and albumen, but neither is available

for use by the plant until it has been acted upon and made soluble. This takes place when it becomes moist, causing fermentation, through which the starch is changed to dextrin and sugar. Chemical changes of this kind cause a rise of temperature, but fermentation does not set in unless the moistened seed is subjected to sufficient warmth. About 85° Fahr. is the best temperature, though it may vary according to the nature of the seed. Germination takes place in wheat in temperatures ranging from 41° to 108° and in corn from 48° to 115°, while the most favorable temperature for the former is 85° and for the latter 98°. Corn having one cotyledon, the cotyledon remains under ground and is absorbed by the plant. This is true also of the pea, both of which have a true leaf at the beginning. In the bean, which, like the pea, has two cotyledons, the cotyledons appear above the ground and there undergo certain changes, furnishing nutriment until they cease to be necessary, when they fall to the ground.



Germination of a Maple Seed, showing successive stages from the seed to the plant with leaves and rootlets.

GERMS. See **Bacteriology; Germ Theory of Disease.**

GERM THEORY OF DISEASE, a view according to which a specific germ exists for each definite disease infectious to the various organs. The theory implies that these germs of living organisms are communicated from an infected person, principally by food, drink, or air, and grow and multiply in the body they come in contact with, producing the disease of which they are characteristic. The particles of contagious matter retain their vitality during definite periods; this, like their growth and promulgation, varies in the different forms. It has been demonstrated that they succumb when subjected to a temperature of 200° to 300° Fahr., and to a low temperature of from 30° to 75° below zero, though in each case the infectious matter must be exposed for a definite time. In the 17th century Hauptmann, a German physician, expressed the view that invisible germs existing in the air may cause epidemic diseases, and all the more important discoveries in relation to contagion have been made since that time.

The living germs are grouped as microörganisms and vary greatly in size and form. They multiply largely by fission, especially the bacterium and micrococcus. The former is rod-shaped and about one ten-thousandth of an inch in length, and the latter is round in form and about one thirty-thousandth of an inch in length. Other forms are the vibrio, spirillum, and bacillus, the last mentioned being formed like rods, slightly larger than the bacterium, and multiply by spores and divisions. Animals having died from splenic fever contain blood laden with swarms of bacilli, which multiply and throw off spores that can be cultivated, and the production may be continued through different classes of fluids. A rabbit or guinea pig can be inoculated with artificially developed contagion, and death ensues from the same disease as that of the animal from which the contagion germ was taken. For many centuries tubercles were known to be hereditary and were regarded noninfectious, but the tubercular bacilli have been discovered.

Dr. Koch, of Berlin, cultivated the bacillus organism and communicated it to animals, in whose bodies it was found after death. In 1876 he published an important treatise on the life history of this form of germ life, and in 1882 announced his discovery of a microörganism in tubercles which he regarded the principal, if not the only, cause of consumption of the lungs. Later he demonstrated that the expectorations of consumptive patients contain microbes which multiply by spores and infect other persons with the disease, even after having dried, in which form they are scattered in the air and breathed in the regular course of respiration. In 1883 Dr. Koch discovered peculiar bacilli in cholera patients. These organisms are formed like a comma and are found in large numbers in the intestines of persons who succumb to the cholera epidemic.

The germ theory of disease was investigated by Pasteur, who also supported it, and contributed much valuable information regarding several forms of bacilli. Germs enter the body and give rise to disease through various channels, particularly through the mouth, nose, eye, ear, and broken surfaces of the skin. The mucous membranes are especially susceptible to certain species of germs, as the mucous membrane of the intestine to the bacillus of typhoid fever and that of the respiratory tract to the bacilli of pneumonia and diphtheria. At first the effect is feeble, but the germs multiply rapidly and soon cause direct local and injurious results. A general knowledge of the conditions of life of the various kinds of organisms has greatly decreased the spread and harmful effect of contagion, while pending investigations prom-

ise valuable and specific discoveries of more particular and complicated forms.

GÉRÔME (zhā-rōm'), **Jean Léon,** historical painter, born in Vesoul, France, May 11, 1824; died Jan. 10, 1904. He studied at Paris under Paul Delaroche, traveled extensively in Italy and the East, and in 1863 was made professor of painting in the Paris School of Fine Arts. The picture entitled "Age of Augustus" was purchased by the French government in 1855 and made him a high reputation. This and many others of his productions have been reproduced largely as photographic copies and excel in beauty of coloring and delicacy of touch. His other well-known paintings include "Slave Market in Rome," "Promenade of the Harem," "Roman Gladiator in the Amphitheater," "Bacchus and Cupid," and "Cleopatra and Caesar." He made many fine productions in sculpture, of which the best known is "Pygmalion and Galatea."

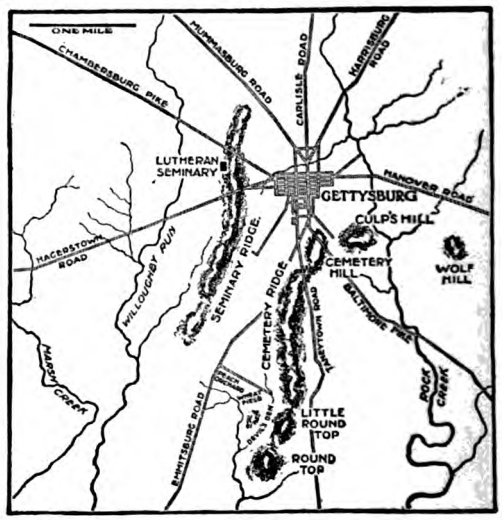
GERONIMO (jĕ-rŏn'ĭ-mō), a chief of the Apache Indians. Nothing is known of his early history. He first sprang into prominence in 1884, when he organized a raid against the settlers of Arizona and New Mexico. Gen. George Crook was ordered to proceed against his band in 1886, when he agreed to terms of peace and was sent to Fort Bowie along with a number of his band, but all of them escaped. General Miles superseded Crook and conducted a vigorous campaign against the Indians. Geronimo was captured and sent to Fort Pickens, Fla., and died at Fort Sill, Okla., in February, 1909.

GERRY (gĕr'rĭ), **Elbridge,** statesman, born in Marblehead, Mass., Jan. 17, 1744; died in Washington, D. C., Nov. 23, 1814. He engaged in commercial enterprises at an early age, accumulated a considerable fortune by close devotion to business, and became a member of the general court of Massachusetts Bay in 1773. In 1776 he was a member of the Continental Congress, where he signed the Declaration of Independence, but, owing to his views against a strong central government, opposed the Constitution. He was chosen a member of Congress in 1780, and was reëlected in 1783 and 1785. The Anti-Federalists elected him a member of the first national Congress in 1789 and reëlected him in 1791, and in 1797 he was commissioner with Marshall and Pinckney to form a commercial treaty with France. In 1811-12 he served as Governor of Massachusetts, during which term he removed members of the opposing party from office and appointed Democrats in their place. He advocated redistricting the State into Congressional districts in a manner intended to benefit his own party in the selection of Congressmen, from which the name *gerrymandering* became applied to the establishment of legislative districts for partisan advantage. In 1812 he was elected Vice President of the United States, but died before the expiration of the term.

GERRYMANDER (gĕr-rў-măn'dĕr). See **Gerry, Elbridge.**

GETHSEMANE (gĕth-sĕm'ā-nē), a place about three-quarters of a mile southwest of Jerusalem, at the foot of Mount Olivet, and contiguous to the garden noted as a favorite resort of Christ and his disciples. In this garden Christ retired the night before the crucifixion and suffered the agony mentioned in the New Testament. Its exact location is not known definitely at present, but is pointed out to tourists in a locality where a number of olive trees stand in an enclosure.

GETTYSBURG (gĕt'tĭz-bûrg), **Battle of,** a celebrated battle that occurred July 1-3, 1863, at Gettysburg, Pa., about 36 miles southwest of Harrisburg. It is considered the turning point in the Civil War. The Union army was under the command of General Meade and the Confederates were commanded by General Lee, each numbering about 80,000 men. The latter had invaded the Shenandoah Valley, crossed the Potomac at Williamsburg in the latter part of June, and was pressing forward to Harrisburg.



VICINITY OF GETTYSBURG.

General Meade had just superseded General Hooker in command of the Union forces, and his plan was to engage the enemy at Pipe Creek, but this was frustrated by the Confederates' attack on Reynolds' division at Gettysburg on July 1, when General Meade hastened forward to his assistance.

The battle raged for three days with fearful carnage. On July 3 the Confederates made their last charge on the Union army, but met with fearful slaughter and were repulsed. As a result, Lee was obliged to retreat with his shattered columns across the Potomac into Maryland. The Union army lost 23,190 and the Confederate nearly 30,000, the losses on both sides including many generals and officers. The

successes for the Federals at Gettysburg and Vicksburg occurred at the same time. Both being decisive, they greatly added to the enthusiasm of the North. The national cemetery at the town of Gettysburg was dedicated by President Lincoln, Nov. 19, 1863, and the government erected a fine monument in its center at a cost of $50,000. In this cemetery are the graves of 3,580 Union soldiers.

GEYSER (gī'sẽr), a word derived from the Icelandic name *Geysir,* meaning to burst or gush forth, and applied to intermittent hot springs in various portions of the earth. The most notable specimens include those in the Yellowstone region of the Rocky Mountains, New Zealand, Tibet, the Azores, and those of the southwestern division of Iceland, thirty miles northwest from Mount Hecla. About 100 separate geysers are active within a small area of Iceland, situated within a radius of two miles. They throw out jets of hot water through steaming apertures at intervals lasting five or six minutes, though some throw jets continuously for a half hour. However, the Great Geyser and the New Geyser are the largest. The former has an opening about eight feet in diameter, and throws up columns of hot water to the height of 75 to 100 feet. In the upper portion the opening is about 50 feet in diameter, which is gradually widening. Its action is preceded by subterranean noises resembling the firing of cannon, a slight movement of the earth's crust, and, after throwing up immense volumes of water, steam begins to take its place. After a time the fountain ceases to act, but the process is renewed after a short intervening period. The New Geyser, or Strokkur, as it is called by Icelanders, is supposed to be connected with Mount Hecla, which is, perhaps, true of all those in that region. The phenomenon is explained by Tyndall in that he thinks the water is brought to the boiling point under pressure, after which it explodes into steam, and this, occuring periodically, gives rise to the intermittent ejections.

The geysers in the Yellowstone region of the Rocky Mountains are the most picturesque and powerful yet discovered. About 50 distinct geysers are located within an area of 30 square miles in the vicinity of the Fire Hole River, and throw up water jets from 50 to 200 feet, though some jets rise to about 250 feet. Of these geysers Old Faithful is the most celebrated. It has an opening six feet in diameter, and at intervals of 50 minutes throws water to a height of from 75 to 150 feet. Another wonderful geyser is the Beehive, which acts once every 24 hours, and throws up a jet 175 feet. The geysers of New Zealand are situated in the hot land district of Auckland and present wonderful phenomena. In this vicinity are numerous natural terraces that form reservoirs for cisterns, and near them are thermal springs and boiling geysers. Several are characterized by emitting continually dense volumes of steam. Geysers occur only in volcanic regions. They are connected more or less closely with earthquakes and volcanic disturbances. Geologists generally hold the view that their action tends to relieve the interior. It furnishes an outlet for matters under the action of heat or pressure, and in this manner counteracts and greatly modifies the more extensive volcanic disturbances.

GHATS (gạts), or **Ghauts,** the name of two chains of mountains in Hindustan, located in the eastern and western sections of that country. The chain of Ghats in the eastern part have an altitude of 1,500 feet and disappear at Cape Comorin. The Ghats in the western part are higher, ranging from 4,000 to 7,000 feet, and extend across India to the Bay of Bengal. They are important in that they form a great watershed and have gold deposits of considerable value.

GHEBERS (gē'bẽrz), or **Guebres.** See **Parsees.**

GHENT (gẽnt), a city of Belgium, capital of the province of East Flanders, 31 miles northwest of Brussels. It is situated in a fertile plain at the junction of the Scheldt and Lys rivers, which are crossed by many bridges, and has communication by numerous canals and railroads. Several of the canals divide it into a number of islands, which are connected by 275 bridges. The city has well-organized public schools and is the seat of a university. Among the public buildings are the Cathedral of Saint Bavon, a Gothic structure built in the 10th century; the Church of Saint Nicholas, begun in the 10th and completed in the 13th century; and the Church of Saint Michael, which contains valuable paintings by Van Dyke. Other buildings include the town hall, the Hôtel-de-Ville, the Palace of Justice, and the Institute of Sciences. It has beautiful parks, gardens, and promenades. The university carries extensive courses of study. It has a library of 115,000 volumes and 750 manuscripts. The manufactures include sugar, hosiery, tobacco, paper, ribbons, vehicles, machinery, and cotton, linen, silk, and woolen goods. It has many flouring mills, machine shops, and railroad car works. The harbor is spacious and furnishes ample moorage for 450 vessels. It has had remarkable prosperity within recent years, owing to its conveniences in navigation and steam and electric railway transportation.

Ghent is first mentioned in history in the 7th century. Baldwin, the first Count of Flanders, erected a fortress on its site in the year 868 to defend it against the Normans. It was made the capital of Flanders in the 12th century and in the 14th supported an army of 75,000 men. By reason of wealth and unity the people of Ghent were able to maintain their liberty and defend themselves successfully against the feudal lords, who came from Burgundy and Spain to encroach upon them. Jacob Van Artevelde led two revolts respectively in 1338 and

1369 against Burgundy, and in 1504 it was deprived of its privileges by Charles V. of Germany. This conquest caused its prosperity to decline, particularly during the reign of Philip II. of Spain. France conquered it in 1792 and made it the capital of the department of Scheldt. In 1814 it was added to the kingdom of the Netherlands, with which it was included until the separation of Holland and Belgium in 1830, when it became a part of the latter. The peace treaty between the United States and England, known as the Treaty of Ghent, was concluded here in 1814. The Germans occupied Ghent in 1914. Population, 1914, 168,970.

GHENT, Treaty of, a treaty between Great Britain and the United States, concluded at Ghent, Belgium, on Dec. 24, 1814. It terminated the War of 1812 and was ratified on Feb. 17, 1815. The British commissioners for negotiating it were Henry Gouldburn, William Adams, and Lord Gambier, and those representing the United States were James A. Bayard, Henry Clay, John Quincy Adams, Jonathan Russell, and Albert Gallatin. The treaty, as signed, provided for the restoration of all conquered territory and for the appointment of commissioners to examine and report to their respective governments on certain boundary questions. Singularly it failed to settle the chief causes of the war, which were the impressment of American seamen, the rights of neutrals, and the participation of citizens of the United States in the Newfoundland fisheries.

GHERARDI (gā-rär'dē), **Bancroft,** naval officer, born in Jackson, La., Nov. 10, 1832; died in 1903. In 1846 he joined the navy as midshipman on the *Ohio,* a vessel of the Pacific squadron, and entered the Naval Academy in 1852. At the beginning of the Civil War he served on the *Lancaster* of the Pacific squadron, was made lieutenant commander in 1862, and served with much distinction at the Battle of Mobile Bay. In 1866 he was promoted commander. By successive promotions he became rear admiral in 1886, and in that capacity supervised the grand review of the naval forces of the world at Hampton Roads in 1893. In 1894 he was placed on the retired list.

GHIBERTI (gē-bär'tē), **Lorenzo,** goldsmith and sculptor, born in Florence, Italy, about 1378; died Dec. 1, 1455. He was trained in the arts of a goldsmith by his stepfather, and later became skilled as a painter and sculptor. At the age of 19 he began painting frescoes in Rimini, when he and seven other artists were selected to compete for the construction of a gate of bronze in Florence. The works of Ghiberti and Donatello were selected by the judges as the best and the contract was awarded to Ghiberti, the latter having chosen for his design "The Sacrifice of Isaac," and completed the gate after working 21 years. Later he executed a second gate which consumed about as much time, and of these two products Michael Angelo expressed the view that they were worthy to occupy and adorn the entrance of Paradise. Among his other works are "Moses on Sinai," "The Fall of Man," and "The Expulsion from Paradise."

GHIRLANDAIO (gēr-län-dä'yō), **Demenico Corradi,** famous painter, born in Florence, Italy, in 1449; died Jan. 11, 1494. He was apprenticed at an early age to a maker of garlands, from which circumstance he was nicknamed the Garland Maker. In 1481 he became a painter and soon won distinction by displaying much inventive power and in producing many superior perspective designs. Among his frescoes are those of the Sassetti Chapel of the Trinity Church and the choir Santa Maria Novella in Florence. His pupils included Michael Angelo, who drew much inspiration and skill from the works of this master. Among his paintings are "Life of Saint John the Baptist," "The Last Supper," and "Nativity of the Virgin Mary."

GHOST, the name applied to an apparition, or the departed human spirit as seen or imagined by the living. The belief in ghosts is very ancient and has existed to some extent in all countries and in every age. Various religious theories are based upon the belief in ghosts, especially ancestor worship, witchcraft, and totemism. The conception of a ghost seems to originate with dreams, a state or condition in which the body is inert and unconscious while the mind is at least partially active. It is not hard to understand that a savage may be suddenly awakened from a sleep, and that his mind has a vivid impression of a dream in which some departed person was thought of, hence the conclusion that the person actually came in contact with the living. Besides, many have regarded death and sleep quite closely related, and instead of believing that the body has departed at the time of death, they look upon it as still existing somewhere in its living form, ready to pass unseen great distances, or to do superhuman acts when brought under the proper influence.

The ancient Egyptians taught that the soul has separate phases and that the *ka,* a phase of the soul, remains near the corpse. This belief was made plausible to them in connection with their art of embalming, since the bodies of the dead were to be preserved indefinitely under the watchful influence of the *ka.* To some a ghost acts with magic, while others look upon such a being as having the spirit manifested at the time the person died. Hence, when the deceased died in peace and contentment, the ghost was thought to have a peaceful disposition, but one who came to death by violence or under great mental agony was thought to have a spirit of the same kind. This caused fear to be felt by those closely associated with the deceased, a view still evident by those who believe certain houses or places to be haunted.

GIANTS (jī'ants), the persons having ex-

traordinary large stature, size, and bulk. History mentions giants and races of giants, but the occurrence of nations of giants is assigned chiefly to the early stages of civilization. Among the races of giants mentioned in historical legendry are the Laestrygones and Cyclopes, while in the English folklore are mentioned the Cornish and Welsh giants. The Bible makes mention of giants in Genesis, vi., 4, in which the sons of Anak, who resided in the vicinity of Hebron, are described by spies as of such gigantic size and proportion that they themselves were relatively as small as grasshoppers. The Bible frequently mentions the Rephaim race of giants and the giants of Emim and Zuzim. In Greek mythology giants are regarded largely as personifications of natural force, and the term became applied to anything possssing unusual or superior power. The natives of Patagonia, South America, have an average height of six feet and are among the tallest of the living races.

While individual giants have lived at various times, there are at present persons who have a height, no doubt, fully as large as any that ever lived. Among the persons attaining to high stature may be named Maximinus, a Roman emperor, who was nearly nine feet tall. Queen Elizabeth had a Flemish porter who was seven feet six inches tall; Cajanus, a giant of Sweden, was nine feet; Patrick Cotter (O'Brien), who flourished in Ireland in 1783, was eight feet eight inches; and the Swedish guard employed by Emperor Frederick William I., of Prussia, measured eight feet six inches. It has been found by careful investigation that giants die comparatively early and have a more feeble mind and body than persons of average stature. Their parts are usually out of ordinary proportion. Among the more prominent differences are broad shoulders and haunches, a small forehead and brain, a large lower jaw and a weak muscular system. The disproportion between the trunk and limbs is greatest. Though the cause for unusual growth in the different parts is not understood, it is known that some portions grow more quickly than others, and often continue to gain in size after other parts have ceased to grow.

GIANTS' CAUSEWAY, a promontory which extends into the North Channel from the coast of Antrim, Ireland. It is a portion of the basaltic formations found in Antrim County and near Londonderry. Large quantities of basalt appear to have been forced outward during the Tertiary period, since which time the intruding rocks have been dissected by erosion, leaving a line of perpendicular cliffs exposed. Some of the cliffs are 500 feet high. The Giants' Causeway is exposed for 300 yards, consisting of many thousands of vertical columns of largely six-sided formations, though many of them have five, seven, eight, or nine regularly formed sides. While the columnar structures vary in size, they range from 20 to 30 inches in diameter.

GIBBON (gĭb'bŏn), the name of an anthropoid ape native to the East Indies. It belongs to the same division as the orangs, gorillas, and chimpanzees, but is smaller and has a more slender form. The arms are sufficiently long to reach nearly to the ground when the animal stands erect. Several species have been studied. The active gibbon is remarkable for its power to swing itself from one tree to another. Other species include the lar, the hoolock, and the white-handed gibbon. These animals, while active in moving about among the boughs of trees, are not able to move rapidly on the ground.

GIBBON (gĭb'bŭn), **Edward,** noted historian, born in Putney, near London, England, April 27, 1737; died in London, Jan. 16, 1794. He was the eldest of seven children, six sons and a daughter. In 1752 he entered Oxford, where he studied fourteen months and adopted Catholicism, but was afterward reconverted to Protestantism while under the care of M. Pavillard, a learned minister of the Calvinistic faith at Lausanne, Switzerland. While at that place, where he spent five years, he studied German and French literature and Latin classics. He pursued with much diligence research in English, which, with his aptness and strong memory, made him a profound thinker and a learned scholar. He returned to England in 1758. Soon after he wrote several works in the French language and in 1763 made a visit to Paris and Lausanne. During the following year he journeyed in Italy. While studying the ruins of the Roman capital and visiting the various places of interest that became prominent during Roman splendor, he conceived the idea of writing his great history.

In 1774 he was elected from Liskeard to Parliament, and for eight years supported the administration of North in its policies relating to America. The first volume of his "Decline and Fall of the Roman Empire" was published in 1776, after laboring seven years. It immediately gave the author a reputation. Subsequently he settled at Lausanne to complete his history, which he did on June 27, 1787, and shortly after retired to spend the remaining years of his life in quiet. His work is a masterpiece of history, glowing with vivid and lively imagination, and is told in a charming narrative style. It is a history of the civilized world for thirteen centuries, portrays the various epochs in which paganism gave way to Christianity, and thus spans a vast chasm between the old and the new. The adverse criticism offered to it is founded on the fact that he gives the early paganism a greater splendor than is thought to be fitting, and curtails the worth and substantial benefit of early Christianity. It is certain that his power of condensation and accuracy in regard to the principal historical facts have not been successfully impeached.

GIBBON, John, soldier, born near Holmesburg, Pa., April 20, 1827; died in 1896. He graduated at West Point in 1847 and immediately entered the army for service in the Mexican War. In 1854 he became an instructor at West Point, where he was made quartermaster in 1856, and at the beginning of the Civil War he joined General McDowell's division as chief of artillery. He took part in the battles of Fredricksburg, Gettysburg, and Petersburg, and in 1876 commanded in the expedition against the Indians under Sitting Bull. The following year he defeated Chief Joseph with 500 warriors in the Big Hole Valley, Montana. He was made brigadier general in 1885 and six years later retired from active service.

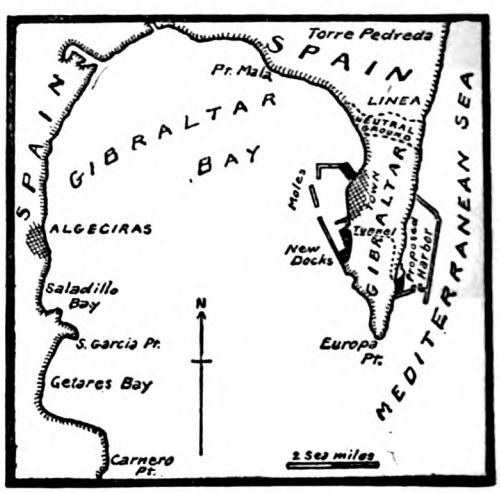
GIBBONS, James, Roman Catholic cardinal, archbishop of Baltimore, born in Baltimore, Md., July 23, 1834. He was ordained priest in 1861 and became assistant pastor at Saint Patrick's church in his native city. Shortly after he was assigned as priest to Saint Bridget's church, later transferred to the cathedral as secretary to Archbishop Spaulding, and soon after became chancellor of the archdiocese. He became vicar apostolic of North Carolina in 1868, with the rank and title of bishop, and was assigned to the see of Richmond in 1872. His appointment as coadjutor to Archbishop Bailey of Baltimore was made in 1877. He succeeded the latter in the same year and became a cardinal in 1886, being the second American receiving this distinction. Among his published works are "Our Christian Heritage," "The Faith of Our Fathers," and "The Ambassador of Christ."



JAMES GIBBONS.

GIBEON (gĭb'e-on), an ancient city of Palestine, about five miles northwest of Jerusalem. It was inhabited by Hivites at the time Joshua conquered Canaan, but they obtained safety and protection from Israel by professing to have come from a far country. When the deception was discovered, the Gibeonites were degraded to the condition of hereditary "hewers of wood and drawers of water unto all the congregation." The five kings of the Amorites besieged Gibeon because it had concluded an alliance with Israel, but Joshua marched against them and it is said that "the sun stood still, and the moon stayed, until the people had avenged themselves upon their enemies." Saul persecuted and nearly exterminated the Gibeonites and their land was possessed by the tribe of Benjamin, but later it became a possession of the Levites. The sanctuary was at Gibeon in a part of the reigns of David and Solomon. The village of El-Jib, located on a summit of a hill characterized by massive ruins, is supposed to be the site of Gibeon.

GIBRALTAR (jĭ-brąl'tĕr), a town in the southwestern part of Spain, situated on the west side of a strongly fortified rocky peninsula of the same name, both belonging to Great Britain. The town occupies a site north of the place where the peninsula terminates in Europa Point, on Gibraltar Bay, and has a convenient and spacious harbor. It is a free port, has important commercial business, and is utilized by the British as a distributing station for their manufactures. The principal street is about one mile long, with which others intersect at right angles. It has many large buildings, including barracks, two theaters, a naval hospital, the governor's building, several churches, and the admiralty. The chief export commodity from the town is wine, though there is a considerable trade in fruits, textiles, and machinery. Several remains of cathedrals of Moorish construction are in evidence, and near the town are the celebrated Alameda Gardens. The lighthouse, built in 1841, is situated on Europa Point, casting a light 150 feet above the sea, which can be seen fully



VICINITY OF GIBRALTAR.

twenty miles. The population of the town, including the garrison of about 6,000 men, is 26,382.

The rocky peninsula of Gibraltar rises to an elevation of 1,410 feet. It is three miles long and three-fourths of a mile wide, and is connected with the mainland by a sandy isthmus known as the neutral ground. On the west is the Bay of Gibraltar, and its eastern and southern shore is washed by the open sea. Powerful artillery is planted on the entire rocky precipice. The south side is almost inaccessible, while the precipitous and rugged extremity on the west is made impregnable by powerful batteries. Cav-

erns and galleries sufficient for the passage of carriages have been cut through the solid rock in various angular and parallel lines, and at intervals of twelve yards portholes have been drilled, which serve for firing heavy ordnance. Besides these are numerous caverns, of which the Hall of Michael is the largest, having a height of 70 feet, a width of 90 feet, and a length of 225 feet, with stalactite pillars supporting the roof. The entrance to this cavern is 1,106 feet above the sea.

This precipitous peninsula was known to the Greeks as Calpe. The Saracens, under their leader Tarik Ibn-Zeyad, first fortified it in 711-12, after whom it was called Gebel-al-tarik, from which its present name was originated. Later it fell into the hands of the Moors and was conquered by the Spaniards in 1462, who so strengthened the works that engineers considered it impregnable. After a vigorous bombardment by the Dutch and English forces in 704, it was reduced and captured. The Peace of Utrecht conveyed it to the English in 1713, in whose hands it has since remained, though desperate efforts to dislodge them were made by the French and Spanish in 1779, but they were completely repulsed after battling in vain for six days. It is no longer the key to the Mediterranean, since modern warships are able to pass it without sustaining effective damages by the guns of the fortress, and, besides, it is not at all likely that the fortress would hold out against modern implements of war. The rocky eminence of Gibraltar and Abjla, now called Ceuta, a precipitous cliff across the Strait of Gibraltar, were anciently called the pillars of Hercules.

The Strait of Gibraltar is a narrow channel connecting the Mediterranean with the Atlantic. It is 36 miles long and has an average depth of 900 feet. At its narrowest point, west of Gibraltar, it is about ten miles wide. A strong and continual current flows in the center of the strait into the sea from the Atlantic, an opposite current passing at the bottom along the coasts, into the ocean. The strait separates the Iberian Peninsula from Africa.

GIBRALTAR, Strait of. See **Gibraltar.**

GIBSON (gĭb'sŭn), **Charles Dana,** illustrator and artist, born at Roxbury, Mass., Sept. 1867. He produced his first sketches in 1886, the earliest being "The Moon and I," which represented the moon and a dog confined by a chain looking at that luminary. Shortly after he published promiscuously, depicting in a charming manner, and attracted wide attention. In 1892 his "Life Sketch" was exhibited in New York City and the following year he made an extended tour in Europe. "The Collection of Eighty-four Drawings," representing various productions, was published in 1894. Other works were issued successively, among them "Canoeing," "Going in to Dinner with the Duke of Sloppy Hather," and "Reading the Will."

GIBSON, John, sculptor, born at Gyffyn, near Conway, Wales, July 19, 1790; died Jan. 27, 1866. He was apprenticed to a cabinetmaker in Liverpool and at the age of sixteen years found employment in the marble works of that city. His talents in making models and figures caused William Roscoe to furnish him the means for studying two years in Rome, where he received instruction under Canova. In 1822, after the death of Canova, he studied under Thorwaldsen. He resided in Rome the remainder of his life, but revisited England a number of times, and in 1836 was made a member of the Royal Academy. His productions are largely of the Greek mythological type and his subjects of youthful personages are especially praised. His only religious subject, "Christ Blessing the Little Children," is greatly admired. He made a portrait statue of Queen Victoria that is now in the palace of Westminster, in which she is represented to lead the figures of "Justice" and "Clemency." Other works include "Mars and Venus," "Hero and Leander," "Hylos Surprised by Nymphs," "Mars and Cupid," and "Venus with the Turtle."

GIDDINGS (gĭd'dĭngz), **Franklin Henry,** socialist and economist, born in Sherman, Conn., March 23, 1855. In 1877 he graduated at Union College and took up newspaper work, and in 1888 became lecturer in political science in Bryn Mawr. Subsequently he held the chair of sociology at Columbia University, where he taught successfully and at the same time gave much thought to the study of social questions. His works include "Principles of Sociology," "Modern Distributive Processes," "Democracy and Empire," and "Inductive Socialism."

GIDDINGS, Joshua Reed, statesman, born in Athens, Pa., Oct. 6, 1795; died in Montreal, Canada, May 27, 1864. He removed to Ohio with his parents at an early age, was admitted to the bar in 1820, and in 1826 became a member of the State Legislature. He served as a representative in Congress for twenty years, beginning in 1838, being elected each time as a Whig. His Congressional record shows him in the light of an aggressive abolitionist. He was censured by a Congressional vote in 1842 for endeavoring to justify the capture of the *Creole,* a vessel laden with slaves, which caused him to resign and appeal to his constituents, who reëlected him by a large majority. The annexation of Texas and the compromise measure of 1850 met his active opposition. In 1860 he received an appointment as consul general to Canada and died there before his term expired. His speeches were published in a volume in 1853. He wrote a work entitled "Rebellion: Its Authors and Causes."

GIDEON (gĭd'e-on), the youngest son of Joash the Abiezrite, and most celebrated of all the judges of Israel. His country had fallen into widespread idolatry during his youth and was plundered by the Amalekites and Midianites,

and was actually under the supremacy of the latter. As Gideon grew to manhood he developed patriotism and religious zeal, and, when the people had reached a stage of resistance, he began to stir up their enthusiasm. By falling suddenly upon the enemy, he routed them at Mount Gilboa, pursuing them across Jordan into the Syrian Desert. In the forty years of Gideon's reign the Israelites enjoyed peace and prosperity. The epistle to the Hebrews mentions him as a hero of faith. Though offered a kingly crown, he religiously refused to accept it.

GILA (hē'lȧ), a river of the United States, rises in the northwestern part of New Mexico, flows westward through Arizona, and joins the Colorado at Yuma, about fifty miles from the mouth of the latter river. The length is 500 miles. Among its tributaries are the Rio San Pedro, Rio Santa Cruz, and Rio Verde. The Rio Santa Cruz discharges into the Gila only part of the year, being lost in the sand much of the time. Ruins of a prehistoric people are found in the Gila basin, and in its proximity are mines that yield gold and silver.

GILA MONSTER, a poisonous lizard, one of the largest in North America, found in the region of the Gila River and the sandy deserts of Mexico. It is inactive and stupid. The average length of the body is about one foot. At the base of the teeth, which are grooved like those of snakes, are large salivary glands. The bite is fatal to small animals and is considered somewhat dangerous to man. The gila monster is classed with the *heloderma,* a genus of North American lizards, which embraces only two species.

GILBERT (gĭl'bĕrt), **Sir Humphrey,** famous navigator, half-brother of Sir Walter Raleigh, born in Dartmouth, England, in 1539. He studied at Eton and Oxford and was destined for the law by his father, but afterward began a military career. He was given an appointment in the army in Ireland, receiving the honor of knighthood for good service, and later served five years in the Netherlands. His work, "Discourse on the Northwest Passage to India," was published in 1576, and soon after he received letters patent authorizing him to occupy remote regions possessed by heathens and not claimed by any Christian people. He sailed in company with Sir Walter Raleigh in 1578, but met with no success. A second expedition was made by him to Newfoundland, of which he took possession in the name of Queen Elizabeth and planted a colony in 1583, but it did not prosper. While attempting to return to England in the latter year, the ship in which he sailed was lost and he perished in the waves.

GILBERT, Sir John, painter and engraver, born at Blackheath, England, July 21, 1817; died Oct. 5, 1897. He learned the art of illustrating by personal effort without a teacher and later took up painting in water colors. In 1853 he was elected a member of the British Water-Color Society and in 1876 became a member of the Royal Academy. Queen Victoria knighted him in 1871. His productions were exhibited in many expositions, including the Paris Exposition of 1878, where he was made a member of the Legion of Honor. He contributed many drawings to *Punch* and to the *Illustrated London News.* Among his works are illustrations for the writings of Longfellow, Scott, and Shakespeare. His productions include "The Mourning of Agincourt," "Convocation of Clergy," "Don Quixote and Sancho Panza," "Touchstone and Audrey," and "The Education of Gil Blas."

GILBERT, William Schwenck, dramatist, born in London, England, Nov. 18, 1836; died May 29, 1911. He studied at London, served for some time as a clerk in a government office and was admitted to the bar in 1852. He was on the editorial staff of several periodicals including the *Fun,* and in 1866 published "Dulcamara," a burlesque. For some time he was associated with Arthur Sullivan, the composer, and worked with him in composing a series of comic operas. These include "Princess Ida," "The Yeoman of the Guard," "The Gondoliers," and "The Mikado." He published independently "Broken Hearts," "The Palace of Truth," and "The Wicked World."

GILBERT ISLANDS, an archipelago in the Pacific Ocean, located on the Equator, almost south of the Marshall Islands. The group includes sixteen small islands, chiefly of coral formation, and the area is 166 square miles. Cocoanut, taro, and various tropical fruits are the chief products. The climate is favorable and the inhabitants are mostly semicivilized, but a number have been converted to Christianity. A part of the islands formerly belonged to Germany, but since 1892 they have been British territory. Population, 1916, 35,0[illegible].

GILDER (gĭl'dēr), **Richard Watson,** poet and journalist, born in Bordentown, N. J., Feb. 8, 1844. He studied at Flushing, Long Island, and afterward took a course of law at Philadelphia. For a short time he served in the Union army during the Civil War and subsequently edited the Newark *Register* and the *Hours at Home.* Later he was editor of *Scribner's Monthly,* which was merged into the *Century,* when he succeeded J. G. Holland as editor in chief. He was a member of many educational and reformed societies. Among his poems are "The New Day," "The [illegible] Remembrance," "Poems and Inscriptions," "In Palestine, and Other Poems," and "A Christmas Wreath." He died Nov. 18, 1909.

GILDING (gĭld'ĭng), the process of applying a thin layer of gold to a surface, such as the surfaces of wood, paper, metal, leather, plaster of Paris, etc. While the processes of gilding differ with the nature of the sub-

to be gilded and the kind of effect required to be produced, they may all be classified under three heads: *mechanical gilding, chemical gilding,* and *encaustic gilding.* In a common method of mechanical gilding or oil gilding, from four to ten coats of whiting mixed with white glue are applied, each in turn being smoothed down with sandpaper and a pumice stone. This surface receives the gold leaf, which is put on by means of a brush. A false gilding, although an old invention, is now used extensively to make a cheap and quite durable gilding. The molding is first covered with silver leaf or tin foil and then is coated with a yellow paint.

Metals are usually gilded by a process of electrotyping (q. v.), but, besides this, various methods of chemical gilding are employed. Water or wash gilding consists in applying to metal a wash of an amalgam of gold and mercury and afterward evaporating the mercury by heat, leaving the gold firmly adhering to the surface of the metal. It is worth noticing that this process of gilding is the best form, being more durable than electro-gilding, and is now used in the more costly kinds of decorative work. Fully 30,000 buttons an inch in diameter may be gilded with one ounce of gold. Other methods of chemical gilding are cold gilding, Grecian gilding, and gilding by immersion. *Encaustic gilding* is applied usually to glass and porcelain. An amalgam of gold protosulphide with iron and turpentine, or other substances, is painted on the ware, and the whole is subjected to heat, which fixes the gold, the luster being brought out by burnishing.

GILEAD (gĭl'ē-ŭd), a mountainous region in Palestine, lying east of the Jordan. It became famous because of being allotted to the tribes of Gad, Manasseh, and Reuben, being of much pastoral value for their large herds. The Scriptures mention its fertility in producing grasses and forests, and names Jabesh, Ramoth, and Jazer as its important cities. Among its rivers were the Arnon and the Jabbok. It was rich in aromatic plants.

Gilead was conquered from Sihon and Og and was held against the Midianites, Ammonites, and Syrians. However, it was finally captured by the Assyrians, who carried the people away in captivity. David found an asylum in Gilead during the rebellion of Absalom. Here Ishbosheth, the son of Saul, was proclaimed King by Abner. Jesus visited the region several times.

GILES (jīlz), **William Branch,** statesman, born in Amelia County, Virginia, Aug. 12, 1762; died Dec. 4, 1830. He studied at Hampton-Sidney and at Princeton colleges, and for some years practiced law at Petersburg. In 1791 he was elected to Congress as a Democrat, serving until 1803, excepting one intervening term, and was a strenuous opponent of the United States Bank. In 1793 he made an attack upon the policy of Hamilton, who was then Secretary of the Treasury, and later opposed the Jay Treaty and supported the Virginia Resolution. In 1804 he was elected to the United States Senate, where he supported the party of Thomas Jefferson, but later opposed the policies of Madison's administration. Giles was rated among the best debaters and parliamentarians of his time, but his continuous opposition to measures that proved beneficial caused him to become discredited as a leader. He retired from the Senate in 1815 and in 1827 was elected Governor of Virginia.

GILL (gĭl), **Charles Ignace,** jurist, born at Pierreville, Quebec, in 1844; died in 1901. He received a careful law training in Quebec and began a successful practice of his profession. In 1871 he was elected to the legislative assembly of Quebec, serving until 1874, when he became a member of the Canadian House of Commons. He served as an influential member of that body until 1879, when he was chosen a member of the Supreme Court of the Dominion. He published a number of important documents and works on law.

GILL, Theodore Nicholas, naturalist, born in New York City, March 21, 1837. He was librarian of the Smithsonian Institution in 1865-67, and in the latter year became assistant librarian of the Library of Congress, in which position he served until 1875. In 1884 he was made professor of zoölogy in the Columbian University at Washington, now the George Washington University, later was associate in zoölogy in the United States National Museum, and became president of the American Association for the Advancement of Science in 1897. His publications are very numerous. They include "Arrangement of the Families of Mammals," "Catalogue of the Fishes of the East Coast of North America," "Synopsis of Fresh-Water Fishes," "Primary Subdivisions of the Cetaceans," "Scientific and Popular Views of Nature Contrasted," and "Principles of Geography."

GILLETTE, William Hooker, actor and playwright, born in Hartford, Conn., July 24, 1855. His father, Francis Gillette, was United States Senator and gave him the benefits of a careful education, including attendance at universities in New York and Boston. He played successfully in these cities and wrote a number of popular plays, which he himself made popular by presentation on the stage. Among his best known plays are "A Legal Wreck," "Held by the Enemy," "Digby's Secretary," and "Secret Service."

GILLS, the respiratory organs of aquatic animals, as fishes, amphibians, mollusks, and crustaceans, serving to breathe the air dissolved in water. In fishes they consist of vascular processes of mucous membrane on either side of the neck. Water is taken into the mouth and forced out through the gill slides, which act upon the blood as it circulates through the

vascular fibrils. The gills in invertebrates are variously situated.

GILMAN (gĭl'mạn), **Arthur,** educator and author, born in Alton, Ill., June 22, 1837. He was educated in Saint Louis and New York, received an honorary degree at Williams College, and in 1871 became an associate editor of the American Tract Society. In 1894 he was chosen regent of the Harvard Annex. He founded the Gilman School, an institution for girls, at Cambridge, Mass., of which he was the director for some time. Among his publications are "History of the American People," "First Steps in English Literature," and "History of Rome." He died Dec. 28, 1909.

GILMAN, Daniel Coit, educator, born in Norwich, Conn., July 6, 1831; died Oct. 13, 1908. He attended the public schools in New England and graduated at Yale University in 1852, after which he traveled and studied in Europe. In 1856-60 he was superintendent of schools in New Haven, and served as State superintendent of schools in Connecticut from 1865 until 1866. In 1872 he was chosen president of the University of California, from which he resigned in 1875 to become president of Johns Hopkins University in Baltimore. He was one of the commissioners appointed by President Cleveland to determine the boundary of Venezuela, and was president of the National Civil Service Reform League. Besides writing many reports and magazine articles, he published "University Problems" and "Science and Letters in Yale." He accepted, in 1901, a position as editor of the "New International Encyclopaedia."

GILMORE (gĭl'mōr), **James Roberts,** author, born in Boston, Mass., Sept. 10, 1823; died in 1903. In 1836 he became partner in a counting-room, and after a successful career established a cotton and shipping firm in New York City, with which he was connected from 1847 until 1857. In the latter year he retired from commercial life to devote attention to literature, and in 1862 founded the *Continental Monthly.* He embarked anew in business in 1873, but retired ten years later to give his attention exclusively to literary work, and became generally known as Edmund Kirke. His writings include "Adrift in Dixie," "Among the Pines," "Rear Guard of the Revolution," "Personal Recollections of Abraham Lincoln and the Civil War," "Campaign Life of Garfield," "John Sevier as a Commonwealth Builder," and "Down in Tennessee."

GILMORE, Patrick Sarsfield, musical conductor, born near Dublin, Ireland, Dec 25, 1830; died Sept. 24, 1892. He took up the study of band music at an early age and in 1847 went to Canada with an English band. Two years later he removed to the United States and played as bandmaster in concerts and circuses at Boston. In 1859 he organized the famous Gilmore's Band, which became noted in America and Europe. During the Civil War he was with a Massachusetts regiment, was assigned to an official position by General Grant, and subsequent to the war played at many musical festivals. He gave concerts at the Paris Exposition in 1887 and while in Europe visited many of the leading cities. Subsequently he traveled through Canada, where he was received with enthusiasm. He was chosen musical director at the Columbian Exposition at Chicago, but died previous to the opening. His compositions include "When Johnny Comes Marching Home," "Ireland to England," and "The Voice of the Departing Soul."

GILOLO (jē-lō'lō), or **Jilolo,** an island of the East Indies, the largest of the Moluccas or Spice Islands, and sometimes called Halmahera. It has an area of 6,350 square miles. The surface is mountainous, the coasts are irregular, and the climate is tropical. Much of the soil is fertile. Among the chief products are spices, sago, fruits, timber, and edible birds' nests. Cattle, horses, and sheep are grown successfully. Galela and Potani are the chief towns. The island belongs to the Netherlands. Population, 1916, 120,108.

GIN (jĭn), an alcoholic liquor distilled from grain and flavored with common salt, juniper berries, oil of turpentine, and various allied substances. In making gin, as in other beverages, each rectifier has his own recipe for regulating the quantities of flavor used. The most renowned article comes from Schiedam, Holland. Alcohol constitutes about fifty per cent of high grade gin.

GIN, a machine used for raising weights. A common form of the gin consists of three long poles fastened together at one end, having a pulley attached, and the poles are set upright with the lower ends equal distances apart. A rope is passed through the pulley and fastened to a windlass, by the revolution of which the weight is raised. The gin for raising coal and other substances from mines is made by erecting a shaft with a large drum, to which is attached a transverse beam, having a horse hitched at one end. The horse is driven in a circle to raise the weight. The horse power is disappearing rapidly before the steam engine but the drum is still in common use.

GINGER (jĭn'jẽr), a genus of plants indigenous to the East Indies, but now cultivated in the West Indies, South America and West Africa. The ginger of commerce is obtained from the rootstalk, which is about the thickness of a man's finger. A very noted grade of ginger comes from Jamaica. It is used as a medicine, especially in a powdered form, and in preparing mild drinks, such as ginger ale. As a medicine it is used chiefly as a stomachic. Essence of ginger, which is properly a tincture prepared of alcohol and ginger, is of value for flavoring.

GINGHAM (gĭng'ạm), a class of cotton

dress goods woven of plain dyed yarn, usually in checks or plaids. Real ginghams differ from calico in that the colors are woven with the cloth instead of being stamped on after weaving. Although gingham was first made in the East, especially in India, it is now an important article of manufacture in Europe and America.

GINSENG (jĭn'sĕng), the root of the *Panax ginseng,* which is native to Asia and North America. It is so named from a Chinese word which signifies *likeness of a man,* owing to the fact that specimens are sometimes found which resemble the human form. These are particularly valuable and often sell for their weight in gold. The ordinary prices range from $2 to $4 per pound. The Chinese employ ginseng for aromatic purposes, but principally as a panacea in cases of bodily weakness, though its virtues are limited. Ginseng is collected in many parts of the United States for exportation. It is cultivated in some places, but not very profitably, since it requires about five years for the root to mature.

GIORDANO (jôr-dä'nō), **Luca,** painter, born at Naples, Italy, in 1632; died Jan. 12, 1705. He was the son of a painter and studied for some time at Rome. In 1679 he visited Florence, where he decorated with frescoes the Corsini Chapel. Charles II. of Spain made him painter to the king, and while in Madrid he decorated the palaces and a number of churches with frescoes. He painted a large number of pictures of various kinds, being rapid in execution and skillful in invention. Among his best works are "Venus and Mars," "David with the Head of Goliath," "Massacre of the Innocents," "The Judgment of Paris," "Lot and His Daughters," and "Saint Francis Xavier Baptizing the Indians."

GIORGIONE (jôr-jō'nā), meaning Great George, eminent painter, whose real name was Giorgio Barbarelli, born in Castelfranco, Italy, in 1477; died in 1511. He studied under Bellini, displayed superior skill, and soon surpassed his master. His productions include many fine scriptural views and pastoral, sylvan, and other idyllic scenes. In Vienna he decorated several important buildings with frescoes. Rare specimens of his portraits are extant, chiefly in the galleries of Milan, Dresden, and Vienna. His best known productions include "Three Philosophers," "Sleeping Venus," "Family of Giorgione," and "The Judgment of Solomon."

GIOTTO (jŏt'tō), **di Bondone,** painter and architect, born near Florence, Italy, about 1276; died Jan. 8, 1337. He was endowed with such natural talent as an artist that he attracted the attention of Cimabue, on account of having drawn lambs of his father's flocks on stone. Accordingly, he was taken to Florence for instruction in art. Twenty-eight frescoes of his earliest works are still preserved. These are particularly valuable on account of being interesting scenes from the life of Saint Francis. His skill consisted largely in the ability to group. He was able to give both simplicity and profound grace, and reproduced with remarkable exactness the beautiful in nature. Dante and other famous men of his time were his friends. As an artist he took high rank. His productions include "Coronation of the Virgin," "A Last Supper," and "Seven Sacraments." The last named is still in a good state of preservation in the Church of Incoronati at Naples. As an architect he executed the dome of Florence and prepared the designs for the Campanile, called Giotto's Tower.

GIRAFFE (jĭ-răf'), or **Camelopard,** the tallest of quadrupeds, constituting a distinct family of ruminants and the only species of its genus. It is a native of Africa, ranging from Nubia to the Cape of Good Hope. Giraffes are gregarious in habit, living in small herds, and feed on the leaves and small branches of trees. They stand eighteen feet or more in height, which is due to the long fore legs and neck. When browsing on grass, the fore legs are stretched apart as far as possible so as to permit the head to reach the ground. The body slopes back, the legs are



GIRAFFE.
Upper view shows prehensile tongue.

slender, and the hoofs are cloven. On the head are two protuberances called horns, which are covered with skin, hair, and bristles. The tongue is very long and prehensile, being employed to grasp food, for which purpose it may be protracted and retracted at will. The hair is short and smooth, of a reddish-white color, and is marked with rusty-brown spots. Their peculiar gait in running resembles a pace. Giraffes are inoffensive, seeking safety in flight, and in captivity become docile and playful. Their flesh is eaten, being quite nutritious, but is not esteemed as food by Europeans. They supply only a limited quantity of milk.

GIRARD (jĭ-rärd'), **Stephen,** philanthropist, born in Bordeaux, France, May 24, 1750; died in Philadelphia, Pa., Dec. 26, 1831. He commenced life as a sailor at the age of thirteen, became captain in 1773, and later conducted important trade enterprises between New York and New Orleans. In 1777 he settled in Philadelphia and engaged in a mercantile career, attaining much success. Shortly before his death he founded Girard College, an educational institution in Philadelphia, by providing an endowment of $2,500,000. In the War of 1812 he rendered valuable aid to the Americans by loaning the government $5,000,000. He became a director of the second United States Bank in 1816.

GIRARD COLLEGE, an institution of learning at Philadelphia, Pa., established in 1832 under a will made by Stephen Girard. It was founded for the purpose of providing facilities to educate and maintain poor white male orphans. Admission is open to students between six and ten years, and they may attend the institution until the age of eighteen years is reached, when they are to be bound out in the arts and trades. The founder provided that applicants for admission are to be given preference in the following order: those coming from Philadelphia; next, Pennsylvania; next, New York; next, New Orleans. Since then the courses of study and the regulations have been modified to provide for the newer conditions which resulted from industrial progress. The institution has 75 professors and instructors, 1,800 students, and a library of 38,000 volumes. The value of the property aggregates $28,500,000 and the net income is $1,150,000. Some of the ablest and most eminent men of America are included in the alumni.

GIRARDIN (zhĕ-rär-dăn'), **Émile de,** journalist and statesman, born in Paris, France, June 22, 1806; died there April 27, 1881. He was the illegitimate son of General Girardin, assumed the name of his father in 1827, and was acknowledged by him in 1848. His first production was a novel entitled "Emile," which is mainly a plea for the rights of illegitimate children. He founded the *Journal* in 1830, a periodical devoted to economics, which soon after reached a circulation of 120,000 copies. Six years later he established the *Press,* a one-cent newspaper which supported the Orleanists in a conservative way. A quarrel on account of politics led to a duel with Armand Carrel, in which the latter was killed. Girardin soon after announced himself a decided republican and promoted the election of Louis Napoleon to the presidency. When Napoleon became emperor, Girardin was in strong opposition and was exiled. Subsequently he returned to France, and in 1862 became the editor of *Liberty,* in which he advocated the Franco-Prussian War. He founded the *France* in 1874 and later the *Little Journal,* both giving support to the new republic. Besides numerous productions of a political nature, he wrote several pieces for the stage, and his wife, Delphine Gray, whom he married in 1831, had a reputation for much ability as a poetess.

GIRARDIN, François Auguste Saint-Marc, journalist and educator, born in Paris, France, in 1801; died April 11, 1873. He studied in Paris, graduating from the College of Henry IV., and traveled extensively in Germany and Italy. His early writings appeared as contributions to the *Journal of Debates.* He was a minister for a short time during the Revolution of 1848, but did not attain to eminence as a statesman. As a lecturer and journalist he ranks as one of the most spirited and skillful of modern France.

GIRDWOOD, Gilbert P., chemist and educator, born in London, England, Oct. 22, 1832. He studied in his native city and in 1854 received a degree from the College of Surgeons in London. For some time he was assistant surgeon in the first battalion of Grenadier Guards and in 1862 went to Canada. He was stationed in Montreal, where he was consulting surgeon for many years in a dispensary and general hospital. Later he was connected with the Royal Victoria Hospital of Montreal. In 1902 he became professor of chemistry in McGill University. He was honored by many scientific and medical associations, and is the author of numerous useful pamphlets and books on scientific and medical subjects. His publications include "Address as President of the Chemical Section of the Royal Society of Canada," "Dislocation of Phalanges," and "Testing for Strychnine."

GIRONDISTS (jĭ-rŏn'dĭsts), a political party of France during the Revolution. They were so named from the department of Gironde, whose deputies were the acknowledged leaders of this organization. Among the chief representatives were Guadet, Brissot, Pétion, Vergniaud, Dumouriez, and Roland. The Girondists were a party of moderate republicans, but their opponents, the Jacobins, charged them emphatically with plotting against the unity of the nation. In 1793 twenty-two of the leaders were arrested, including Madame Roland, who

was an active supporter of the party. Most of them were taken prisoners and beheaded, or died by their own hands.

GISSING (gĭs'sĭng), **George**, novelist, born in Wakefield, England, in 1857; died in 1903. After completing his college education, he engaged as teacher and took up literary work as a professor in London. His first work to attract attention was published in 1884, entitled "The Unclassed." As a writer he assumed a pessimistic vein. Among his writings are "Life's Morning," "The Nether World," "New Grand Street," "Eve's Ransom," "Our Friend the Charlatan," and "By the Ionian Sea."

GIZZARD, a part of the alimentary canal of birds and some invertebrates, whose function is to grind up the food. In this respect it answers the purpose of the teeth in many animals. In birds the gizzard is the second, or true, stomach, in which the food is crushed after it is softened in the glandular stomach, or *crop*, which is situated in the lower part of the esophagus. The interior is lined by a horny epithelium, or shelly plates. The gizzard is assisted in grinding the food by small pieces of gravel and other hard substances, which are swallowed for that purpose by most birds.

GLACE BAY (glās), a city of Cape Breton Island, on the northeastern coast, fifteen miles northeast of Sydney. It is on the International Railway and has a good harbor. The surrounding country contains productive coal mines. It has a large trade in merchandise, machinery, coal, and produce. Among the principal buildings are several fine schools, a public library, and many substantial business blocks. Population, 1911, 16,562.

GLACIAL PERIOD (glā'shạl). See **Glaciers.**

GLACIERS (glā'shẽrz), the immense masses of ice and snow which move almost imperceptibly from higher to lower levels, found chiefly in the more elevated valleys and slopes of mountains. In the upper parts they consist of soft snow, which is later pressed into compact masses, and at the lower portion the accumulations are constituted of clear, hard ice. The great quantities of snow which form above the snow line press in masses slowly down the slopes. By the pressure, due to the weight of the layers, the air confined in the snow is pressed out, and the lower part of the glacier is thus changed into a compact mass of pure ice. In some cases ice is formed from the snow by successive thawing and freezing, though this phenomenon more or less affects all glaciers below the snow line.

Glaciers resemble rivers, since the solid material which passes into them moves as drainage within their channel. However, the current is much slower, often imperceptible. The larger glaciers, like rivers, have numerous affluents, and peculiarities of flow and velocity. Where tributaries unite and flow on with the main mass, they do not intermingle as the waters of rivers, but the mass coming from each affluent may be distinctly traced throughout the remainder of the course. Owing to the diminished friction at the top and middle portions, these parts move more rapidly than those at the bottom or sides, and in this respect are similar to rivers. On the surface they are usually quite smooth, but at regular intervals in the direction of a valley and in the slope of the bed they are broken into deep fissures called *crevasses*. These occur most frequently at the bend of a valley, where one side is compressed and the other extended, and at such places the crevasses extend obliquely up the stream, and at abrupt descents in the bed directly across.

The crevasses vary from less than an inch to great chasms over one hundred feet in width, and in the larger openings the depth is generally greatest. On the surface the appearance is a dirty white, while down the walls of the crevasses the ice has an appearance of deep azure blue. Where glaciers flow from elevated mountains in the temperate climates, they usually melt in the warm months of the year as they proceed downward, and are thus transformed into streams of water. In this way they frequently give rise to rivers. Among the rivers that have their origin in glacier streams are the Rhine and Rhone of Europe and the Ganges of Asia. The velocity of the ice and the rapidity with which it melts govern the extent of the glacier below the snow line. They retreat up the mountain during an unusually warm summer, following a light snowfall in winter, and, on the contrary, advance further down the valley when heavy snows in the winter are followed by a cool summer.

Glaciers possess much transporting power, and carry to a lower level large volumes of stone and dirt which accumulate on the surface of the moving mass, after rolling down from adjacent elevations. The accumulations are called *moraines*. Generally the moraines are most abundant at the side of glaciers, where they are called *lateral moraines*. At the point where two glaciers unite the meeting edges are marked by a crevasse which is called the *medial moraine*, and at the end of the glacier a *terminal moraine* extends across the valley in a wide curve. Medial moraines one hundred feet in height are not uncommon, while terminal moraines attain to several hundred feet. The erosive power of glaciers is very effective and tends to greatly deepen the valleys through which they move. Evidences of extinct glaciers are found in many localities, and their former existence is attested by deep grooves cut in the bottom and sides of the valleys, and by deposits formed of rock, mud, and bowlders carried by their moraines. When glaciers extend into the sea, like those of Greenland, the base is undermined by the warmer waters of

the ocean and the waves break off great fragments, which form floating mountains of ice called *icebergs*. These are carried into warmer latitudes by ocean currents, where they drop their load of moraine by melting. Icebergs appear most numerously in the north Atlantic, into which they descend from the extensive Arctic glacier region.

The total number of glaciers in the world is not less than 1,100, of which one hundred are of large size. In the tropical and temperate climates they abound only in the more elevated portions of mountains, while whole continents and islands are apparently covered by them at the poles. Those of the Antarctic regions are probably sheets of ice fully 10,000 feet thick. The Muir glacier, in Alaska, is about 150 miles long and 500 feet deep, and is probably the largest in the world. In the north polar region they abound extensively, but those of Greenland and the islands north of North America are the only ones known to any extent in that region. Others are more or less widely distributed in the continents. Those of the central Alps of Europe have been studied with the best results. The most widely known of these is the Mer de Glace, which rises on the slopes of Mont Blanc and has three large branches, descending into the vale of Chamouni. The longest glacier of the Alps is Aletsck, which has a course of fifteen miles, while the Aar glacier has an estimated depth of 1,515 feet, being regarded the deepest.

The Glacial period, or Age of Ice, is so named from the climatic conditions which prevailed in the Northern Hemisphere at a time when intense cold and sheets of ice prevailed in what are now temperate latitudes. It began in the Newer Pliocene period and terminated before the close of the Post Pliocene, though Arctic conditions prevailed only at intermittent times. The occurrence of great glacial action is evidenced by numerous traces in North America and Eurasia. In the Alpine regions evidences of early glacial action are common, and it is certain that the plants now found on the summits of these mountains were brought down from the Arctic regions at that time. Man existed during the latter part of the two distinct glacial periods traceable in the Alps. The cause of these phenomena in past ages is explained by Sir Charles Lyell by assigning to the north polar regions vast elevations, from which the streams of ice moved southward. Sir John Herschel attributes astronomical reasons, which seem the more probable. The chief cause assigned is the varying eccentricity of the earth's orbit. In 1800 A. D. it was .0168, but 210,000 years prior to that time it was .0567, making the difference of 10,250,000 of miles and the winter days 27.8 in excess. However, the possibility of astronomical causes is militated against by the absence of glacial periods prior to the Newer Pliocene time.

GLADDEN (glăd'dẹn), **Washington,** clergyman and author, born in Pottsgrove, Pa., Feb. 11, 1836. He studied at Oswego Academy and at Williams College, and in 1860 was ordained pastor of the State Street Congregational Church, in Brooklyn. Subsequently he preached at North Adams and Springfield, Mass., and in 1882 became pastor of the First Congregational Church at Columbus, Ohio. He was editor of several papers and wrote many works of more than usual literary value. Among them may be named "Young Men and the Churches," "From the Hub to the Hudson," "Applied Christianity," "Ruling Ideas of the Present Age," "Plain Thoughts on the Art of Living," "Social Salvation," "Working Men and Their Employers," "Burning Questions," and "Practice of Immortality."



WASHINGTON GLADDEN.

GLADIATOR (glăd'ĭ-ā-tẽr), in Roman antiquity, a man who fought with deadly weapons against another gladiator or wild beast, especially in the amphitheater, for the amusement of the



ROMAN AMPHITHEATER.

people. The first gladiatorial fight occurred at the funeral of Brutus in 264 B. C. between his sons, Marcus and Decius. Originally, a gladiator was a prisoner, a slave, or criminal; later the performance became a mere spectacle, and knights, senators, and even women and emperors entered the arena. The gladiatorial exhibits were announced by private circulars or proclamations. Gladiators marched to the arena on the day of the performance, where they were matched in pairs and their weapons were formally examined. In many cases the combats were fought between a man without arms, but provided with a net in which to ensnare his opponent and a three-pronged fork with which to spear him when caught, and an opponent in full armor, who sought safety in evading his enemy while seeking to pursue and kill him. The audience witnessing the combat became frantic with excitement, and yelled and applauded while rising in their seats, shouting their approval when ghastly blows were dealt, followed by blood spouting forth. In most places the arena was protected from the rays of the sun by a gorgeous awning, while strains of music floated in the air, drowning the cries of death. It was not uncommon to distribute Syrian perfumes to overcome by their odor the scent of blood, and the spectators were delighted by the most brilliant scenic decorations.

The gladiatorial battle opened at the sound of a bugle and a shout of command. A gladiator dropped his weapons when severely wounded, and as a plea for life held up his forefingers. This was sometimes in the gift of the people, but more often was vested in the vestal virgins. During the empire the power to spare life was lodged in the sovereign. Mercy was signaled by waving handkerchief or by a turned down thumb, while all hope was forbidden by a clenched and upright fist. Only the brave were accorded mercy. In the time of Julius Caesar it was common to give exhibits by couples fighting. He gave a show in which 320 were engaged. Titus provided an exhibition that continued one hundred days. In it the gladiators fought with wild beasts. The great gladiatorial exhibition of Trajan engaged 10,000 men, who fought with each other and wild beasts, continuing 123 days.

The wild beast fights were the most revolting, and by them many Christian martyrs lost their lives. Among the animals engaged were elephants, rhinoceroses, camelopards, hippopotami, tigers, lions, and many others of a ferocious nature. During naval fights the arena was flooded with water. A naval fight given by Augustus engaged 30 vessels, and during the combat 36 crocodiles were pursued and killed. The combatants were classified according to the arms they carried. Thus, one carrying a shield, helmet, sword, and breast armor was called *samnite;* those carrying a lasso or noose, the *laguearii;* those armed with Thracian buckles and a short sword were known as *secutores.* Gladiatorial games were forbidden in the reign of Emperor Honorius, about 404 A. D.

GLADIOLUS (glă-dī'ō-lŭs), a genus of ornamental plants of the Iris order. They have bulbous roots, a tubular two-lipped corolla, a trifid stigma, and ensiformed sheathing leaves. Many species are native to South Africa and Eurasia. The flowers are beautiful and richly colored, and many species have been improved by intercrossing. In color they are greatly variegated and include pure white, violet, crimson, scarlet, and yellow. Each of these is variously modified and shaded. As house plants they are popular, the majority of those cultivated in America coming originally from Cape Colony.

GLADSTONE (glăd'stŭn), **William Ewart,** statesman and author, born in Liverpool, England, Dec. 20, 1809; died May 19, 1898. He was the son of Sir John Gladstone, a Scottish merchant of London, entered Eton in 1821, and in 1831 graduated with marked honors from Oxford. In 1832 he was elected to Parliament from Newark and two years later became Junior Lord of the Treasury under Sir Robert Peel. In 1841 he was made Vice President of the Board of Trade and Master of the Mint, supporting the policies of Peel. While serving on the board of trade, he abolished restrictive tariffs on the exportation of machinery, and in 1844 secured a reduction of railroad rates. His active support of the repeal of the Corn Laws lost him his seat for Newark, but he was returned in 1847 by Oxford University.



WILLIAM E. GLADSTONE.

After the death of Peel, in 1850, Gladstone surged to the front as a financier, and by his vigorous speeches against the budget of Disraeli became noted as one of the most eminent historic orators in Parliament. In 1852 he became Chancellor of the Exchequer, which position he held during the ministry of Aberdeen and a short time in that of Lord Palmerston. His speeches on finance became of much interest to the people and were always looked forward to with enthusiasm. In 1858 he was sent as high commissioner to the Ionian Islands, and about the same time went from the Tories over to the advanced Liberals. He was returned to Parliament in 1865, and, after the death of Lord Palmerston, became the liberal leader of the House of Commons.

Under the leadership of Gladstone a reform bill was passed in 1867 which greatly reformed the suffrage. The following year he carried measures abolishing compulsory taxes to support the church and turned his attention to the distracted condition of Ireland. His seat for South Lancashire was lost in 1868, but he was elected for Greenwich, and the Liberal majority in the new Parliament made him premier. In 1870 the Irish Land Act was passed under his leadership, and shortly after a reformed election law was secured and the Alabama Claims were settled, but in 1874 Parliament dissolved and the Conservative party retired Gladstone from office. We next find him busy with literary and historical researches, but in 1880 he was again made Prime Minister, in which he continued, with only a short interval, until 1886. During this time numerous important laws were passed, among them legislation affecting Ireland, an extension of suffrage, and a reform of the civil service.

His vigorous advocacy of home rule for Ireland resulted in an adverse decision by the people, and he was succeeded by Lord Salisbury. His leadership of the opposition in Parliament continued and resulted in the formation of the Gladstonian party, whose principal tenet was the home rule for Ireland. This issue was submitted to the people in 1892 and again brought Gladstone forward as Prime Minister, but he soon after retired from public service on account of impaired health and old age. Gladstone had implicit faith in the people. He believed that freedom operates to make men better and more competent, and ranked highest as a lawgiver, diplomat, and patriot among the statesmen of England of the last century. Among his numerous writings are "Studies on Homer and the Homeric Age," "Impregnable Rock of the Holy Scripture," "Financial Statements," "The State in its Relations with the Church," "Special Aspects of the Irish Question," "Vatican Decree Bearing on Civil Allegiance," and "State Persecutions of the Neapolitan Government."

GLANDERS (glăn'dĕrz), a contagious disease which affects certain domestic animals and which may be communicated from them to man. It is especially harmful to the animals that have an undivided hoof, such as horses and mules, but swine, cattle, and sheep are subject to it. The disease is due to a specific microbe discovered in 1882. At present no treatment is known under which a cure can be effected, though in rare instances the affected animal may recover. It makes its appearance in swellings of the submaxillary glands, accompanied by a dry cough and discharges from the nose. These discharges cause the disease to spread, especially when left in contact with the harness, stables, vehicles, or the watering places. As the disease advances small bunches or nodules form under the skin, which afterward break open and form ulcers. It is recommended that animals affected with the glanders be killed and that the places frequented be carefully disinfected.

GLANDS, in anatomy, the organs of the body that secrete or separate some particular fluid from the blood. Anatomists divide them into two great classes, known as true secreting glands and ductless glands. *Secreting glands* are special organs, such as the liver, kidneys, and pancreas, and the mammary, lachrymal, and salivary glands. The *ductless glands* include the spleen, the thyroid, the thymus, and the parotids. An ordinary secreting gland consists of a number of follicles, all of which open into a common duct by which the glandular product is discharged. The follicles are contained in the interior cells, which are the active agents in the secreting process, while their exterior is surrounded by a network of capillaries, from whose contents the materials of secretion are extracted.

In the lower class of animals the glands are quite simple as compared to the same or similar glands in the higher forms of animal life. The *mammary gland,* which is quite complex in the higher mammal, presents a very simple arrangement in the lower types of this class, being merely a cluster of follicles, each of which discharges its contents by its own orifice. The *thymus gland* is located partly behind the sternum and partly in the lower part of the neck, and is largest in infants, disappearing at or about maturity. Its function is to form colorless corpuscles in the blood, and it likely supplies a need in the infant that is cared for by other organs at maturity. Hibernating animals have this gland, which is enlarged by the presence of fat during activity, and appears to supply nourishment and maintain temperature during the period of hibernation. The *sudoriferous* are the sweat glands; the *parotid glands* are the seat of the disease known as mumps; and the *submaxillary, parotid, buccal,* and *sublingual* secrete the saliva. Inflammation and solid swelling are among the diseases that affect the lymphatic glands.

GLASGOW (glăs'kō), the largest and most important city of Scotland, situated on the Clyde River, in Lanark County. The southern part of the site is level, while the northern portion is situated largely on convenient elevations of varying heights. Many of the streets are platted at right angles, being both wide and straight, and the buildings are mostly of freestone. For architectural beauty Glasgow ranks among the best cities of Great Britain. A Gothic cathedral in the northeastern part of the city is the most historical structure. It was commenced in 1240 and completed within 200 years. The length is 320 feet; breadth, 63 feet; and height, 90 feet, with a spire from the center 225 feet high. Among the buildings of modern construction are the Bank of Scotland,

the general post office, the Merchants' House, the Royal Exchange, the Stock Exchange, and the Central Station and the Saint Enoch Station hotels. The institutions of learning include the University of Glasgow (q. v.), Free Church College, Glasgow and West Scotland Technical College, Saint Mungo's College, Saint Margaret's College for Women, and Anderson's College of Medicine. The Mitchell Library, which receives a grant from the city and serves the purposes of a public library, has 125,000 volumes.

George Square, the finest public place in the city, contains many monuments of great beauty, including those of Queen Victoria, Sir Robert Peel, Sir Walter Scott, and the Prince Consort. It has many fine public parks, numerous boulevards, electric lights and street railways. telephone and telegraph connections, and is the junction of numerous railroads. Among the manufactures are woolen, cotton, silk, and linen goods, calico prints, dyed and bleached textiles, iron and steel, machinery, chemicals, pottery, tobacco, sugar, glass, beverages, jute, and leather. In 1895 a central underground railroad was opened for traffic, which affords rapid transit to many parts of the city. Since 1894 it has owned and operated the system of street railways. Practically all of the public utilities, such as the waterworks, meat markets, harbor ferries, and systems of gas and electric lighting, are owned by the municipality.

The importance of Glasgow is due largely to its location near the mouth of the Clyde, which permits navigation by the largest vessels. The interior highlands and adjacent districts are reached by means of canals, railways, and electric lines. Its harbor and docks are very extensive and near them are vast marine-engineering and shipbuilding yards, which are noted for their large output of vessels. In the vicinity of the city are deposits of coal and iron, through which the manufacturing enterprises have been largely facilitated. Glasgow was founded in 560 A. D., when the Celts that populated the region were induced by Saint Kentigren to embrace Christianity and a small church was erected on the site of the great cathedral. However, its prosperity began in 1707, when its commerce became widened and shipbuilding took on large proportions. At present it has seven representatives in Parliament. Population, 1911, 784,455.

GLASGOW, University of, an institution of higher learning of Great Britain, located at Glasgow, Scotland. It was founded by Bishop Turnbull in 1451, but was reorganized by acts of Parliament in 1858 and in 1889. The university is governed by a special court, which consists of the principal, the rector, the lord provost of Glasgow, and a number of representatives of the city and university. The chancellor is elected by the general council and holds his position for life, while the rector is appointed for three years by the students. The departments include those of science, art, law, medicine and surgery, and theology. It has a fine botanical garden, an observatory, and a library of 215,000 volumes. The attendance averages about 2,350 students. Many noted scholars and scientists are included in the alumni.

GLASS (glàs), the compound product of silica, having at least two metallic oxides, the most common being those of calcium or lead and potassium or sodium. It is brittle and sonorous at ordinary temperatures, generally transparent or translucent, and is made soft and ductile by heating. The point of melting and fusion varies with its composition. Hydrofluoric acid acts upon it, though ordinary solvents do not. It breaks with a vitreous fracture. Its discovery is not known, though as a commodity of utility and commercial importance it is as old as any known production of man. The Egyptians made use of glass before the Hebrew exodus. Their monuments and ruins bear evidence that they used it for vases, beads, and various ornaments as early as 3250 B. C. The Assyrians, Babylonians, Phoenicians, Greeks, and Romans were all more or less acquainted with and skilled in its manufacture. The vases made by the Romans were among the most beautiful productions of their arts, being finely finished by engraved figures and relief forms, variously colored on shaded background, and sometimes more or less transparent. Among the surviving specimens still preserved is the famous Portland or Barberini vase, though relics of inferior productions of great antiquity are abundant.

The use of glass for windows is much newer than its manufacture for other purposes. It was not utilized in buildings until 250 years after the beginning of the Christian era. Europeans began to use glass extensively to admit light into dwellings and public buildings in the latter part of the 3d century, though for the purpose of lighting churches it was used fully four centuries earlier. The early Puritan settlers of Jamestown, Va., began its manufacture in 1608, and from their rude beginning it has sprung into a vast industry in America. The production in the United States represents a total annual value of about $68,500,000. Practically all classes of glass are manufactured in Canada and the United States and several varieties, such as pressed glass, are American inventions. The principal manufactures of Europe are located in Germany, Belgium, and France, though the enterprise is carried on with more or less success wherever civilization extends. In window glass the American product exceeds all others in quality, while in the finer plate glass and the grade used for optical instruments the manufactures of Europe still exceed those of America. Among the

states producing glass extensively are Pennsylvania, New Jersey, New York, Massachusetts, Indiana, Ohio, and Missouri.

In manufacturing the various kinds of glass different materials are used, such as fine sand or powdered flint, together with salt, alkali, alkaline earth, or metallic oxide. Crown, sheet, and plate window glass are made of silica, lime, and soda. *Flint glass* used for dishes, lamp chimneys, goblets, and bottles is more brilliant and tough than window glass and is made of silica, lead, and potash, though some forms of bottle glass are made of a variety of mixtures containing alumina. Any kind of glass may be *colored* by metallic oxides, though other substances are employed. In applying the coloring matter it may be mixed with the other ingredients while in a melted state, or a partially colored effect may be secured by taking the melted material from two vessels—the one colored and the other transparent—and in manufacturing the product so construct the desired article that a coat of colored glass will cover the other. Alumina and silver produce a yellow color; copper, gold, and oxide of iron, the reddish; cobalt, bluish; oxide of copper and oxide of iron, the greenish; chloride of silver with peroxide of iron, the orange color. To destroy the transparency of glass it may be roughened on the surface, when it is called *frosted glass,* and has the appearance of hoar frost. It is used in buildings where light is admitted, but the view is obstructed. Among the most important properties of glass is its transparency, and, next to it, its effective resistance to acids. When heated, it can be formed into any shape, or may be spun into fine threads and used for ornaments and wearing apparel. It is a very efficient nonconductor of heat. When cold, it is most effectively cut by the diamond.

In glass manufactories the furnace is constructed of fire brick. Two openings are arranged in the furnace; one contains large melting pots and the other is employed to facilitate placing the half-blown product into the heat for softening it. Gas and crude oil are used for fuel, as most other fuels emit too much smoke. The melting pots are of the best fire clay and cement, usually three feet high, about four feet in diameter, and are open at the top. They are made with much care in order to bear the immense heat required in melting the sand and other materials of which the glass is made. Under ordinary care pots serve about two months and the furnace about two years, though neither should be allowed to cool. The melted material contained in the pots is dipped by workmen with an iron tube, called a *blowpipe,* this being turned over and over until a sufficient quantity gathers and assumes an oval form. After placing the melted glass in a proper mold, it is blown and formed into the desired shape, such as a bottle, vase, tumbler, or some other vessel, this depending on the mold used.

The *engraving* on glass is effected by means of a sand blast, while *glass cutting* is done by a process of grinding on a cast-iron wheel, with which water and sand is brought in contact. Cut glass is prized for its brilliancy and is used in making fine grades of table glass. The ornamentation is not put on until after the glass has been annealed, a process under which it is gradually cooled, and requires about 36 hours. *Sheet glass* is made by taking the melted material from the pot, when it is blown and whirled until it assumes a cylindrical form. The ends are then cut off, the cylinder is cut open longitudinally, and the sheet is heated, pressed and rubbed until it is flattened out. *Plate glass* is made by pouring the melted material upon a table, which has a marginal edge equal in height to that desired for the thickness of the glass. It is then flattened out by a roller passed over the table, resting on the edges, and thus secures equal thickness throughout. In making *stained glass,* the paint, which is usually compounded of the oxides of metals and oil of turpentine, is applied when cold and the colors are afterward stained into the glass by heating the latter. *Mosaic glass painting* is a department of art painting and is not to be associated with glass manufacture. The most common mosaic glass painting is executed with an enamel or a stain, though stained glass is often used for the background.

GLASTONBURY (glȧs'tŭn-bĕr-ĭ), a town of Somersetshire, England, on the Brue River, about twenty miles southwest of Bath. It has some export trade and various manufacturing establishments. In the vicinity are mineral springs. Glastonbury is noted chiefly for its ancient tradition and history. It is famous on account of the legend that Joseph of Arimathea came there with the Holy Grail and founded the first church in Britain. In 1539 the supposed grave of King Arthur was discovered while excavating for the abbey and a church. The abbey is one of the oldest in England. Population, 1916, 4,185.

GLAUBER'S SALT (glou'bĕrz), the popular name of a salt found native in sea water and the water of many mineral springs and saline lakes. It was so named from J. R. Glauber (1604-1668), a German chemist, who first prepared it by decomposing sodium chloride with sulphuric acid. Glauber's salt has a bitter saline taste, is soluble in water, and becomes liquid when heated. It loses most of its water by crystallization and becomes a white powder when exposed to the air. The chief use of this product is as a purgative medicine, especially in veterinary practice. It is used in fixing lead mordants in dyeing and printing and in the production of certain kinds of glass.

GLAZING (glāz'ĭng), the art of imparting a smooth, shining surface to anything, such as

pottery, gunpowder, and paintings, to prevent them from being penetrated by fluids. The most common mixture for earthen vessels is constituted of ground flint with oxide of lead, which is generally used, but in various proportions and with different tints.

GLAZUNOFF (glä-zo͞o-nôf'), **Alexander,** composer, born in Saint Petersburg, Russia, in 1865. He studied at the Polytechnic Institute in Saint Petersburg, and later took training under several musical masters, among them Liszt at Weimer, Germany. In 1881 he finished his first symphony, which was accorded an enthusiastic reception, and in 1889 he visited Paris and London. In the latter city he conducted his fourth symphony at the London Philharmonic Society, and in 1897 he conducted at Saint Petersburg the national Russian symphony concerts. The Thomas orchestra at Chicago played many of his compositions, especially concert waltzes and smaller instrumental works, many of which are very popular in America. Being prolific and efficient as a composer, he is regarded a representative of the national school of Russia.

GLEIWITZ (glī'vĭts), a city of Germany, in the province of Silesia, 98 miles southeast of Breslau. It is on the Klodnitz River and the Klodnitz Canal, has steam and electric railways, and is regularly platted and well paved. The manufactures include paper, glass, hardware, cigars, clothing, and machinery. Gleiwitz is first mentioned in the 12th century, but its larger development dates since the last two decades. Population, 1910, 66,983.

GLENCOE (glĕn'kō), a celebrated valley of Scotland, in the County of Argyll, near Loch Etive. The sides are almost perpendicular, rising abruptly to heights of 3,000 feet above the valley and giving the locality a wild and sublime aspect. In 1692 it was the scene of the Massacre of Glencoe, when Mac Ian, chief of the Macdonalds of Glencoe, was destroyed by his enemies under the leadership of Sir John Dalrymple. It had been arranged that he and his followers should have pardon if they submitted to William III. and Mary before Dec. 31, 1691, but the delay in the surrender caused his enemies to take advantage of the technicalities and treacherously destroy about sixty men, women, and children. Though the morning was stormy, about 300 men and women escaped, but a number of them perished from cold and hunger.

GLENDOWER (glĕn'dō͝or), **Owen,** famous Welsh chief, last native to assume the title of Prince of Wales, born in Montgomeryshire, in 1349; died Sept. 2, 1415. He was called to the English court, where he became a favorite of Richard II., and later was made esquire to Henry IV. Lord Gray seized some of his lands in the early part of the reign of Henry IV., and, failing to secure assistance from the king, Glendower took up arms to establish the independence of Wales. After conducting a war with more or less success, he succeeded in taking Lord Gray and Sir Edward Mortimer prisoners in 1402. Two years later he formed an alliance with Charles VI. of France against England and secured the assistance of a powerful French army. The war was carried on for many years and a pardon was offered him several times on condition that he would submit, but this he refused to do and continued to harass the English king until his death.

GLENS FALLS, a village of Warren County, New York, on the Hudson River, 55 miles north of Troy. It is on the Delaware and Hudson Railroad. The noteworthy buildings include the Crandall Free Library, Glens Falls and Saint Mary's academies, the Parks Hospital, and an old ladies' home. Among the manufactures are machine shops, iron foundries, brick works, paper mills, and cigar, shirt, and furniture factories. It has electric street railways and lights, waterworks, and a sewerage system. The surrounding country contains valuable deposits of limestone and black marble. It was incorporated in 1837. Population, 1900, 12,613; in 1910, 15,243.

GLENVILLE (glĕn'vĭl), a village of Ohio, in Cuyahoga County, five miles from Cleveland, to which it was officially annexed in 1905. It is situated east of Gordon Park, on the Lake Shore and Michigan Southern Railroad, and is a well-improved place. The manufactures consist chiefly of furniture and machinery. It was settled in 1804 and incorporated in 1872. Population, 1900, 5,588.

GLEYRE (glâr), **Marc Charles Gibriel,** noted painter, born in Chevilly, Switzerland, May 2, 1806; died May 5, 1874. His parents died when he was nine years of age, when he was placed under the care of an uncle at Lyons, and spent four years at Paris in the study of art. Later he resided in Rome, traveled extensively in Greece, Asia Minor, Egypt, and Nubia, and on returning to Europe opened a studio at Paris. In 1840 he exhibited his "Apocalyptic Vision of Saint John," by which he attracted favorable attention. In his paintings he exercised much care by being slow in execution and succeeded in giving an effect that always pleased. A number of his works won medals and, while exhibiting at the Retrospective Exhibition in behalf of exiles in Alsace and Lorraine, his death occurred suddenly. Among his productions are "The Young Nubian," "Separation of the Apostles," "Dance of Bacchantes," and "Earthly Paradise."

GLOBE, a sphere used in geography and astronomy for the study of terrestrial and celestial phenomena. A *terrestrial globe* is a common schoolroom apparatus and is a useful supply in the study of geography. A globe of this kind may be made of plaster, metal, or pasteboard, upon the surface of which is a map or a representation of the surface of the

earth. The extremities of an axis passing through the center represent the poles of the earth, and it is usually so constructed that it may be turned upon the axis to indicate the rotation of the earth. Meridians and parallels of latitude are indicated by lines drawn upon the surface. The meridians are usually drawn through every 15° of the Equator, hence each two indicates points that differ by one hour in time. The globe is suspended in a brass ring somewhat larger than the diameter, within which it turns upon the axis, and is usually mounted on a wooden stand. In size globes vary from those six inches to four feet in diameter, though much larger ones have been constructed. A *celestial globe* has represented upon its surface the stars, which are placed in positions to indicate their actual location.

GLOBE, county seat of Gila County, Arizona, 70 miles east of Phoenix, on the Arizona Eastern Railroad. It has extensive interests in copper mining and owes its recent growth to the development of that industry. The features include electric lighting, high school, public library and courthouse. Population, 1910, 7,083.

GLOMMEN (glŏm'mẹn), the most important river of Norway, rises in Lake Aursundsjö, and flows into the Skager Rack. Its source is in the province of South Trondhjem, near the town of Röros, and its course of 350 miles is in a general southwesterly direction.

GLOUCESTER (glŏs'tẽr), a river port and city of England, on the Severn River, about ninety miles northwest of London. Numerous railroads and canals facilitate important commercial enterprises, for which it is noted. Among the noteworthy buildings is the cathedral, one of the largest in England, being 140 feet wide and 420 feet long. The tower is 225 feet high. It contains the Great Peter's Bell, weighing more than three tons. Other buildings include the public library, a theological college, King's School, and an asylum for the insane. Among the manufactures are flour, cordage, cutlery, ships, ironware, and machinery. Gloucester was a Roman station under Aulus Plautius. At the time of the Saxons it was an important center of trade. Population, 1911, 50,029.

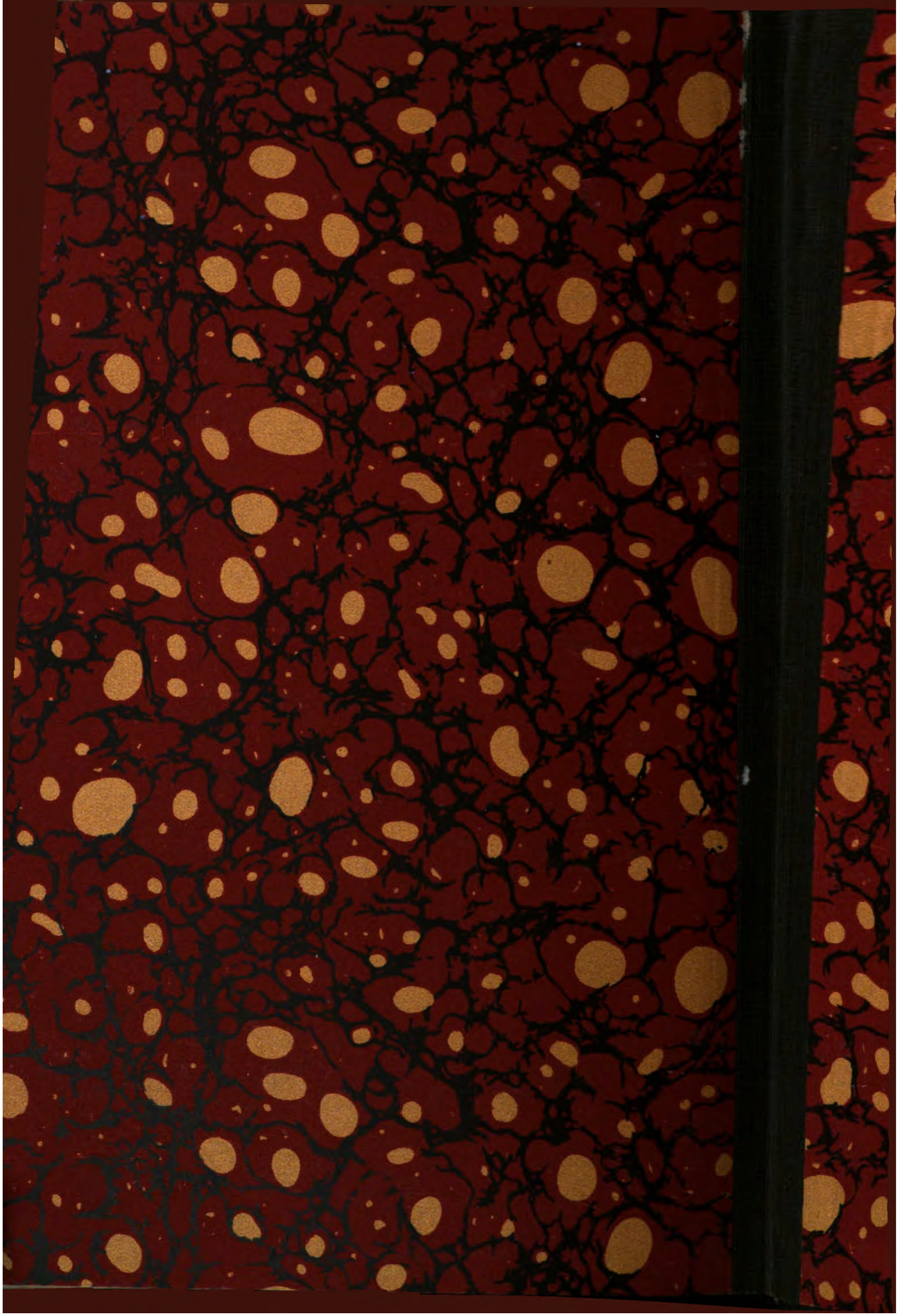
GLOUCESTER, a port of entry in Essex County, Massachusetts, thirty miles northeast of Boston. It is on the Boston and Maine Railroad, near Cape Ann, and includes Riverdale and several other villages. The municipal improvements include waterworks, electric and gas lights, stone and asphalt pavements, and electric street railways. It is distinctly a commercial city and its domestic fisheries are the most important in America. Those employed in mackerel and cod fishing include about 5,000 persons. It is the seat of a United States piscicultural station, is the center of a large foreign trade, and has a convenient harbor. The manufactures include clothing, machinery. mucilage, tents, seines, sails, canned fish, and granite products. In 1765 it had a population of 3,763, since which time it has grown steadily. Population, 1905, 26,006; in 1910, 24,398.

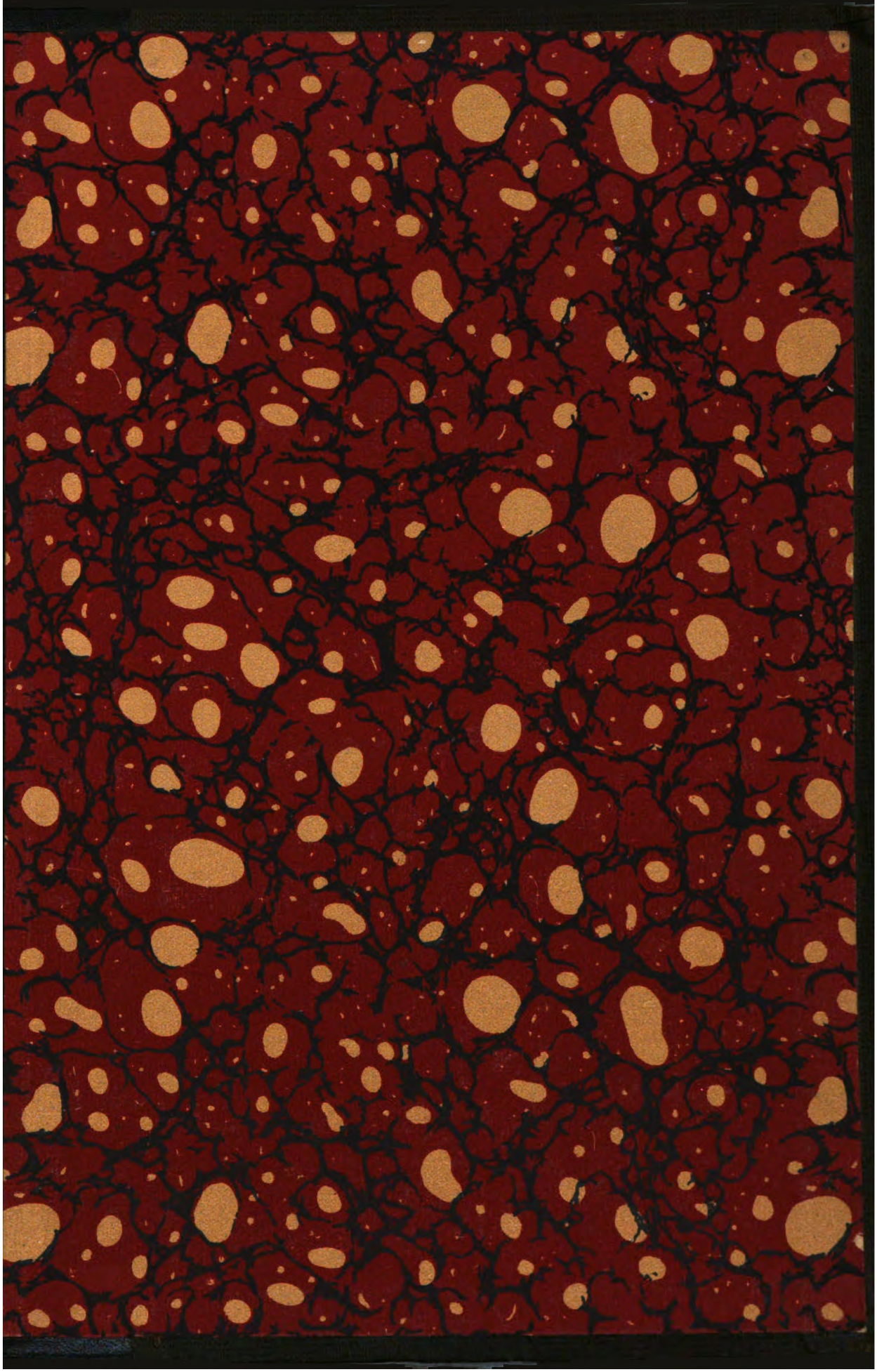
GLOUCESTER CITY, a railroad center of Camden County, New Jersey, on the Delaware River. It is on the West Jersey and Seashore and the Atlantic City railroads, one mile south of Camden, and is connected with Philadelphia by steam ferry. The chief industries are fishing and manufacturing. Among the manufactures are canned fish, calicoes, ginghams, and machinery. It was settled in 1677 and incorporated in 1868. Population, 1905, 8,055; in 1910, 9,462.

GLOVE (glŭv), a covering worn on the hand, having a separate sheath for each finger. Gloves are made of various materials, such as silk, wool, linen, cotton, fur, and different classes of leather. Several kinds of the finer gloves are manufactured of the real skins of goats, but most kid gloves are made of lambs' skins. The so-called dogskin, buckskin, and doeskin gloves are manufactured chiefly from sheepskin. In manufacturing this class of gloves the leather is dressed as light as possible and each glove is cut by means of a die. Much of the sewing is done by machinery. The glove is stretched over a metal hand, which is first heated on the inside, and the material is smoothed or dyed as desired. Gloves are cleaned with oil of turpentine, camphor, or benzine, the last mentioned being the cheapest and most serviceable substance now in use. Machine sewing is used largely in the cheaper grades, the best being hand-stitched. Gloversville, N. Y., contains large gloveworks, though factories are located in the larger cities throughout Canada and the United States. The finest and most expensive gloves produced in the world are made in France.

GLOVERSVILLE (glŭv'ẽrz-vĭl), a city of Fulton County, New York, on the Cayadutta River, fifty miles northwest of Albany. It is on the Fonda, Johnstown and Gloversville Railroad. The streets are mostly broad and well paved. It has sewerage, stone and macadam pavements, electric lights, and street railways. Among the noteworthy buildings are the high school, the Nathan Littauer Hospital, and a public library with 10,000 volumes. The manufactures include machinery, vehicles, cigars, gloves, and buckskin and other mittens. In the manufacture of gloves it takes very high rank among the cities of America. It was known as Stump City until 1832, when it received its present name, and was incorporated as a city in 1890. Population, 1905, 18,672; in 1910, 20,642.

GLOWWORM, a name applied to several species of serricorn beetles. They somewhat resemble a caterpillar and are remarkable for the luminosity of some of the segments of the abdomen. The male has wings and emits a very faint light when flying about at night, and is attracted to the female by her soft, but strong, light. The luminous matter is capable





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